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ARMY Communicator

Voice of the Signal Regiment ● PB 11-04-1 Edition 2004 Vol. 28 No. 4

The Regiment at War

- Boutelle gives testimony on terrorism
- Brigade Task Force communicates in OEF
- Media on the battlefield: 'A non-lethal fire'
- AN/PRC-150HF radio in urban combat

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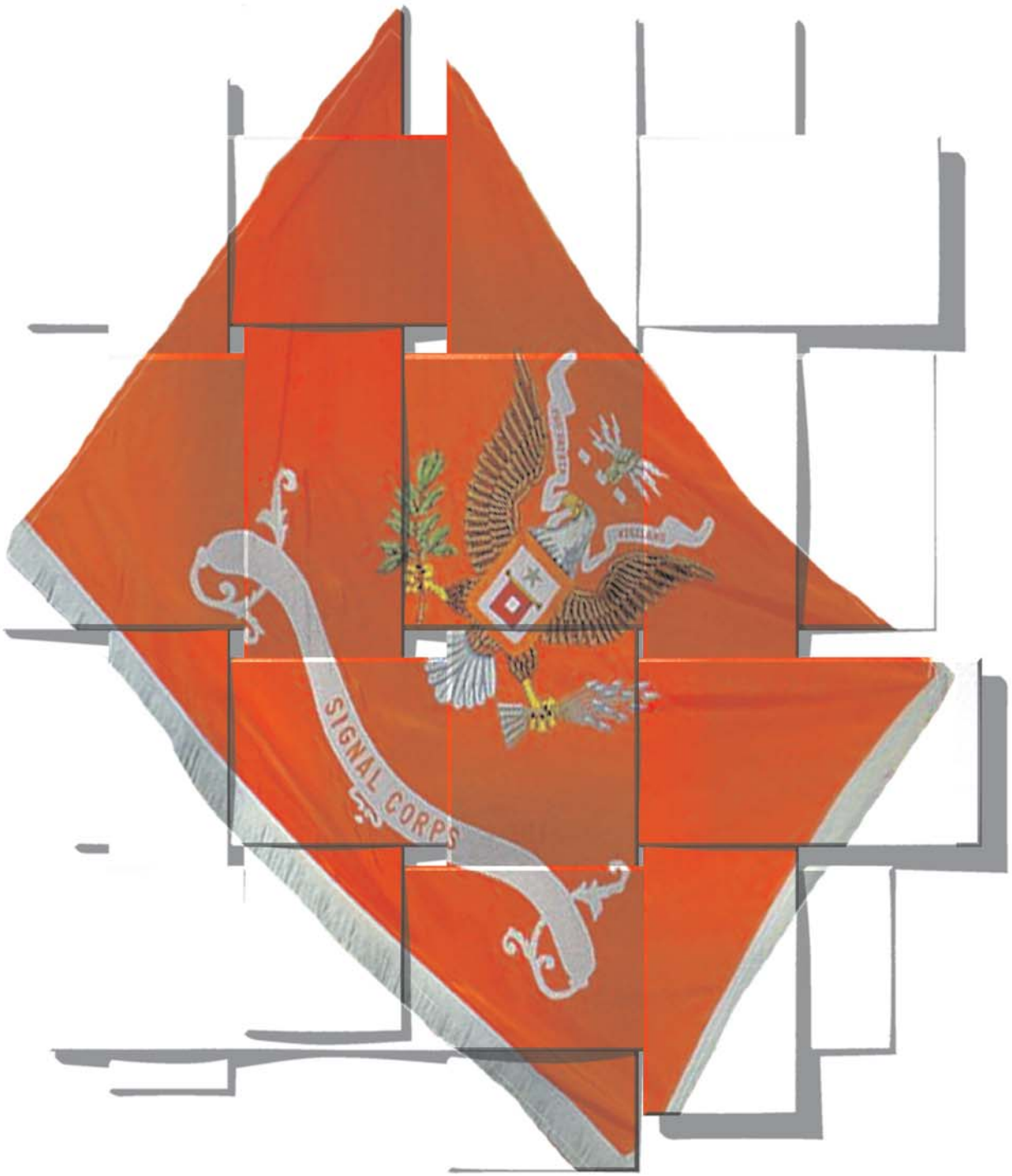

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Chief of Signal's Comments

The Regiment at War

Fellow Signaleers, I commend all of you for the great work you're contributing to our Regiment and our Army, and I'd like to "crow" a little about the vital role all of you are playing in America's Global War on Terrorism. An analogy between the events of December 7th, 1941, and those of September 11th, 2001, is very appropriate.

In each case, the focus of our nation and the use of her national power were radically changed and redirected as a result of events on those days. Our nation's Army, battle-tested many times in our history, was called upon to ensure that not only our own country remained safe and free, but that oppressed people of the world could share in the dream that has made our country what it is today. Take comfort and pride in knowing that our nation is in full support of our mission. You are all in our nation's thoughts every day.

We are an Army at war. The Signal Regiment, as it's always been, is a vital part of our nation's war on terrorism. You are making it happen. Signal Soldiers from all components are fighting side-by-side, ensuring that commanders have the information that is vital to success on the battlefield.

Our leaders continue to deploy and redeploy their units from all points on the globe. The Soldiers of the Signal Regiment understand and accept that sustained operations and a high Operations Tempo will be the norm for some time to come. Separation from our families will be unavoidable, and will put added strain on our Army and on our loved ones at home.

BG Janet A. Hicks
Chief of Signal

Our Regiment's brigades, battalions, and separate companies have performed brilliantly, and continue to serve in Operations Enduring Freedom and Iraqi Freedom. When we started to tally up a list of our units that had been deployed to the area of responsibility, or soon would be, we quickly discovered that it was quicker to count those who had not. OEF and OIF have touched nearly every unit…Network Command, our corps units, division signal battalions, plus the critical support of strategic signal assets, the Chief Information Office/G6 team, Communications-Electronics Command, our brethren in the National Guard and Army Reserve units…they've all contributed to our nation's continuing success in OEF and OIF. Our Army civilians are invaluable in every aspect of this continuing campaign. And over a thousand of our industry partners have deployed and are present anywhere and everywhere their support is needed.

I can assure you that every element of our Army is engaged fighting this war. As never before, we are fighting as a Regiment with all of our diverse elements coming together in defense of our nation.

Your accomplishments are a source of inspiration for every member of our Regiment and will be captured in history books for generations. At the same time, I worry about each and every one of you and wish that you could all return safely to your home stations. As we all understand, however, that is not possible as long as there are those who wish our country harm.

I close by expressing, once again, that my pride in what you are doing, and the superb manner in which you are doing it, is boundless. One Team.

Pro Patria Vigilans.

Acronym QuickScan

AOR – area of responsibility
CECOM – Communications Electronics Command
CIO – Command Information Office
NETCOM – Network Command
OEF – Operation Enduring Freedom
OIF – Operation Iraqi Freedom
OPTEMPO – Operations Tempo

'We are an Army at war. The Signal Regiment, as it's always been, is a vital part of our nation's war on terrorism. You are making it happen.'

U.S. ARMY SIGNAL CENTER AND FORT GORDON

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Voice of the Signal Regiment

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Boutelle gives testimony

The following is the testimony of LTG Steven W. Boutelle Chief Information Officer/G-6 United States Army before the Committee on Armed Services Subcommittee on terrorism, unconventional threats and capabilities United States House of Representatives regarding Department of Defense Information Systems Architecture and Interoperability. It is dated Feb. 11, 2004.

Mr. Chairman and members of the subcommittee, thank you for the opportunity to provide testimony on Department of Defense information systems architecture and interoperability.

Today, we are an expeditionary Army supporting our nation in the Global War on Terrorism. Our Army is in the midst of a massive reorganization creating modular fighting units that can be rapidly deployed around the world. Our forward deployed forces must have capability to reach back from anywhere on the globe through global networks to tap intelligence resources and collaboration tools on a real-time basis. Our forces will continue to deploy as an integral part of a Joint force and often as a part of a coalition team as we continue the fight against a global terrorist network.

Our forward deployed forces must have capability to reach back from anywhere on the globe through global networks to tap intelligence resources and collaboration tools on a real-time basis.
-- LTG Steven W. Boutelle

As a Joint or Coalition expeditionary force, interoperability is not an option. Existing systems must be interoperable or made interoperable. All new systems must be developed with Joint interoperability and interdependencies as Key Performance Parameters. The good news is that our services have achieved much interoperability today. Many of our communications systems and networks are based on the same commercial Internet Protocol that served as the foundation for the World Wide Web. This is a mandated standard of the Department of Defense's Joint Technical Architecture. This, and other commercial based information technology protocols and standards are a foundation for achieving Joint, interagency and multi-national interoperability. The Army has nearly completed the migration to an IP-based network as part of the larger Joint Network. In accordance with the Joint Technical Architecture and current DoD guidance, we are moving to IP version 6.0 for a more efficient and effective network. In practical terms, interoperability exists today at the network level and extends through space-based and terrestrial-transmission systems. These transmission systems serve as part of the Global Information Grid supporting users around the world. The DoD GIG Data Strategy directs a more complete migration to commercial web-based technologies, which will further strengthen interoperability across the Joint, interagency and multi-national environment.

Network level interoperability is vital to all organizations within the DoD. An example of this type of interoperability is a user with an Apple computer sending email to a user with an IBM computer. Both computers have different operating systems and probably different email programs, and the network is comprised of piece parts from many manufacturers such as Sun, Cisco, IBM and Microsoft. However, common and enforced standards, such as those that reside in the Joint Technical Architecture, ensure your email transits the mix of equipment and is successfully delivered. An example of the military application of network interoperability is the Joint Blue Force Situational Awareness, or Blue Force Tracking, implemented in Operation Enduring Freedom and Operation Iraqi Freedom. While each service used different platforms and computers to track Blue (friendly) Forces, the Network interoperability standards enabled commanders on the ground

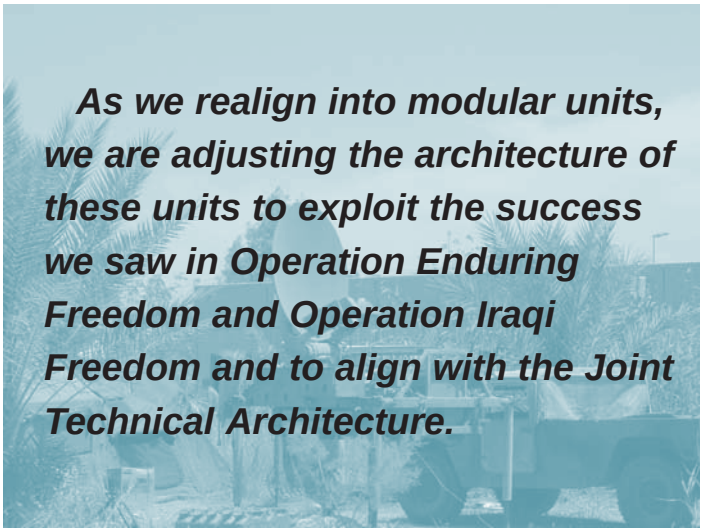
to enjoy near-real-time visibility of friendly forces on dissimilar systems from individual trucks, tanks, helicopters, command centers and even here in the Washington area.

Our Army and DoD continue to expand the network interoperability of all of our programs. We continue upgrading individual platform interoperability based on the standards of the JTA. The bottom line is that while we have interoperability between the services now, it will be even more pervasive and richer in the future. Additionally, we are committed to working with OSD to ensure the GIG aligns with the Federal Enterprise Architecture.

As the Army transforms to the Future Force, we are developing lighter, highly mobile, more modular and strategically responsive organizations fully enabled by a more robust network of satellites, fiber-optic cables, radios and tactical-communication systems. Battle-command capabilities, tied together by these enhanced networks will be the bridge from current to future forces and enable the Expeditionary Joint Forces Commander to fully conduct interdependent, globally dispersed, network-centric warfare. Battle command is the essential operational capability that fundamentally enables the global conduct of future Joint operations. Our Chief of Staff has seventeen focus areas; one of these is networks. As we realign into modular units, we are adjusting the architecture of these units to exploit the success we saw in Operation Enduring Freedom and Operation Iraqi Freedom and to align with the Joint Technical Architecture. We are now in fact restructuring the Third Infantry Division at Fort Stewart, Ga., which has recently returned from Iraq. We are redesigning this unit to be flexible, adaptive and Joint.

Systems such as the Joint Tactical Radio System, Warfighter Information Network - Tactical, Strategic Tactical Entry Point, Teleport and Global Information Grid - Bandwidth Expansion are essential to support warfighters with secure, simultaneous real-time voice, data, imagery and video globally.

The Joint Tactical Radio System is the next generation radio. This system changes the construct for radio hardware by relying on software to change frequencies and waveforms. In addition to increased ease of interoperability, a common family of radio systems across the department allows for savings in development and procurement costs. JTRS represents Joint communications at its purest form. It is a fully integrated and fully interoperable system combining the best of multi-service programmatic, technology and operational experience and leadership while taking advantage of economies of scope and scale for development. This high-capacity, software-programmable family of radios is multi-band/multi-mode capable and will provide simultaneous voice, data and video communications enabling it to support the worldwide Joint mission tasks. It also lays the foundation for achieving network connectivity across the frequency spectrum and provides the means for digital information exchanges, both vertically and horizontally, between Joint warfighting elements. It represents a key part of success for our future warfighter and Joint teams.



The Warfighter Information Network - Tactical is absolutely essential in our expeditionary Army. WIN-T will serve as the Army's communications network for the future warfight, replacing the Army's twenty-five-year-old tactical communications system, Mobile Subscriber Equipment. WIN-T leverages the rapid growth of commercial communications technologies we all enjoy, and brings those technologies on to the modern battlefield. This will allow the Army to fully use enhanced services such as high-resolution imagery, operations on the move and collaborative tools across the battlefield. WIN-T represents the Army's requirement to be born Joint, is a mission critical system, and is an integrating communications network that brings next generation communications to the Joint Warfighter. Based on DoD's Joint Technical Architecture, it is optimized for offensive and Joint operations, while providing the Theater Combatant Commander the capability to perform multiple missions simultaneously and still maintain campaign quality.

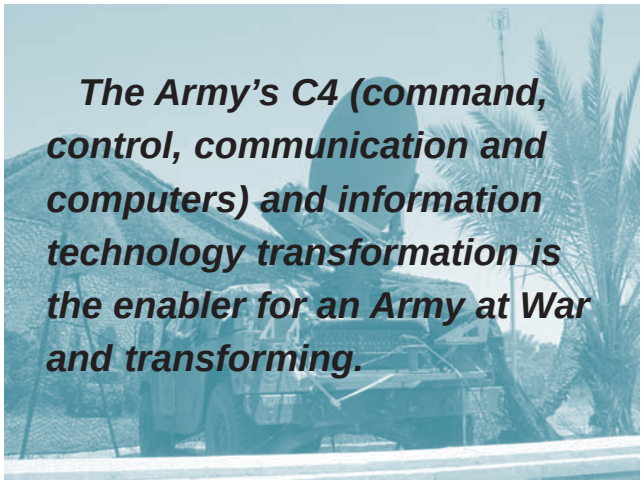
The Army's flagship transformation program, the Future Combat Systems, is a networked "system of systems" that uses advanced communications and technologies to integrate the soldier with "families" of manned and unmanned platforms and sensors. The FCS network is composed of various communications nodes supported by UAVs (Unmanned Aerial Vehicles) and UGVs (Unmanned Ground Vehicles). The FCS is a distributed network centric system leveraging WIN-T to allow reach back through STEP sites, Teleport, and the GIG-BE to critical war fighting resources.

This highly agile and lethal force will provide the tactical formations required to fulfill the Army's vision for its future force.

The Satellite/Teleport/STEP are currently, and will remain, a linchpin for the war on terrorism. Our nation's military relies on this information projection capability to link intelligence sources with commanders allowing collaborative planning and execution worldwide on a real-time and virtually instantaneous basis. We actively participate in the Joint Satellite Communications Acquisition Council with our sister services, OSD and Joint partners. Additionally, the Army meets with ASD (NII) Senior C4 (command, control, communications and computers) representatives to discuss emerging satellite communications architecture and technology insertions to gain synergy and ensure the Army architecture is thoroughly aligned with the other services and combatant commands.

Upgrading select STEPs to Teleports is another extremely important program. Selected Strategic Tactical Entry Point STEP sites that currently access only military satellites are upgraded with additional satellite terminals operating in commercial Satellite Communications and radio bands. This capability greatly increases our ability and flexibility to support the warfighters deployed globally. This is currently funded to take place in three generational upgrades from Fiscal Year 03 through FY 08.

The Army is actively involved in synchronizing its information systems architecture. The Joint Tactical Radio System, the Warfighter Information Network - Tactical, Strategic Tactical Entry Points and Teleport are all being developed in conjunction with guidelines from the Joint Technical Architecture and OSD, which continues to provide adequate oversight. Our nation is in the midst of a global fight on terror. The relevant and ready Army functions as the country's expeditionary force of power. The future success of the Army depends upon its ability to transform within a fully integrated Joint environment and we cannot afford to delay that transformation. The Army's C4 (command, control, communication and computers) and information technology transformation is the enabler for an Army at War and transforming. With the continued support of Congress, we will achieve our goal of an integrated net-centric, knowledge-based Future Force that functions as an integral part of the Joint warfight. Our nation requires a relevant, ready, Joint and integrated Army capable of winning the nation's wars.



LTG Boutelle is Chief Information Officer of the Department of the Army. He assumed this posting in July 2003. Previously he served as director for Information Operations, Networks and Space, Office of the Chief Information Officer. From 1996-1997, Boutelle was trail boss responsible for air defense, intelligence, artillery, logistics, maneuver, satellite and tactical radio software and systems integration for the Army's Task Force XXI. Other duty assignments include U.S. Army Europe deputy Chief of Staff of Operations and Plans, and Chief Test and Evaluation and Executive Officer for the Command System Integration Agency. Boutelle's awards include the Distinguished Service Medal, the Legion of Merit with Oak Leaf Cluster and the Defense Meritorious Service Medal. He received his bachelors from the University of Puget Sound and a masters in business administration from Marymount University.

Acronym QuickScan

C4 – Command, Control, Communication and Computers
DoD – Department of Defense
FCS – Future Combat Systems
FEA – Federal Enterprise Architecture
FY – fiscal year
GIG – Global Information Grid
IP – Internet Protocol
JIM – Joint, interagency, and multinational
JTRS – Joint Tactical Radio System
MSE – Mobile Subscriber Equipment
OSD – Office of the Secretary of Defense
SATCOM – satellite communications
STEP – Strategic Tactical Entry Point
UAVs – Unmanned Aerial Vehicles
UAGs – Unmanned Ground Vehicles
WIN-T – Warfighter Information Network

Brigade Task Force communicates in OEF

In the Afghanistan environment, with many mountains and low grounds coupled with the harsh weather and environment, the segment was key to the fighter's success.

by CPT Michael P. Martel

Fighting and communicating in the deserts of Afghanistan proved to be tough and tricky for the 1st Brigade Task Force of the 82nd Airborne Division. The mountainous terrain and sandy environment made line-of-sight communications impossible and equipment maintenance essential. This is how one light infantry brigade solved the communication problems of Operation Enduring Freedom and some of the lessons learned along the way.

First the basics: single-channel communications

Tactical satellite ruled the battlefield with single-channel communications. It was the primary means of communications for all firebases for both voice and data. Although we tried several methods for sending data, the ViaSat Data Controller-400 cards became the method that worked best. We tried High-Performance Wave guide software, but not enough Harris117F radios were present to make it the primary method. Another reason HPW was not used was because of after action reports from the previous 82nd units. They had reported that the 117Fs while using HPW would often overheat. In some cases the radios would damage some of their own internal parts. The radios were too valuable to risk losing. We did experience some problems using the VDC-400 cards (such as getting settings correct, cables breaking, occasional data errors, etc.) but the method worked most of the time. PSC-5s and 117Fs were the primary radios used. Both radios can push 20 watts and are menu driven. The infantry relied heavily on these radios, to where they started asking for more radios than available. The Multi-Band Inter/Intra Team Radio was the only solution. With only five watts, this radio provided a solution that was not as powerful as the bigger radios, but with its smaller size and versatility, it was the infantry favorite. The MBITTR in the TACSAT mode soon became known as the MSAT. The MST-20 was also used when available, but its age made it prone to maintenance problems. These radios also lacked the ability to pass data.

Key to the success of the single-channel TACSAT communications was the channel or segment. In the Afghanistan environment, with many mountains and low grounds coupled with the harsh weather and environment, the segment was key to the fighter's success. It was important to have a wideband segment that units in contact could talk on excitedly without having to slow down the messages to make them understood. It was important to have a dedicated channel, not a Demand Access Multiple Assigned channel, that units could talk on immediately without waiting for a time slot. It was important being on a satellite with an elevation great enough that units did not have to be on the highest point or exactly on the correct azimuth and elevation to get on the bird. Most units mounted antennas pointing straight up on

The single-channel TACSAT is used while the brigade and battalion commander talk during a combat operation.

vehicles and were able to communicate while on the move.

Each infantry battalion had five single-channel TACSAT radios made up of two 117Fs and three PSC-5s. The brigade had an additional three radios for use in the tactical-operations center, tactical-assault center and one to use where needed. Aviation units also had single-channel TACSAT radios to talk to aircraft and ground stations throughout the country. We did not have enough radios to monitor more than one network with all the firebases on the command net.

The command net was primary with the data net used occasionally. The MBITTR became worth its weight in gold and would have been more useful if a dismounted amplifier solution was available for a dismounted role.

Very-high-frequency, frequency modulation radios were also used in the single-channel secure mode. This was for one primary reason – special forces and other branches did not frequency hop. The brigade itself was very proficient at frequency hopping, but the other joint units were used to using single channel. Although communications security was changed weekly for these nets, the reported threat of enemy forces breaking our encryption or intercepting our transmissions was very small, so the decision was made to not use frequency hopping. Each firebase or airfield had its own net. Since all organizations needed to be on that net or be able to get on that net quickly, single channel was used. This also made it easier for inbound aircraft to talk to the ground units. The use of single channel made it significantly easier to program a station in the command and control aircraft that was not planned for. The C2 aircraft was widely used to control many air assaults as well as operations and ground assault convoys.

High frequency was not used effectively in this operation. This was not because radios were not available. It all goes back to the same old problem with HF – having a good training program. The new Harris PRC-150 radios worked great. These radios with Automatic Link Establishment capability cut out the need for a lot of frequency propagation, testing frequencies and working with antennas. Some areas even had their radios working great and communicating clearly over great distances. Other stations couldn't talk to anybody. The biggest problems we say were antennas and getting the settings correct on the radios. Most Soldiers do not know enough to select or set up the correct antenna. The AS2259, near vertical incident sky wave, worked sometimes, but a doublet antenna 10 feet off the ground nearly always worked. With its many levels of menus and setting, the PRC-150 presented problems to those who were untrained and those who liked to make adjustments.

The role of Mobile Subscriber Equipment

Mobile Subscriber Equipment was a success in this operation; however, habitual support relationships went away. In an operation where the light-infantry brigade task force is the largest fighting element, telephones only at the brigade headquarters and forward support battalion did not work. The infantry battalions required phones as well as

secure Internet protocol routing network and nonsecure Internet protocol routing network drops. The forward support battalion, which supported much more than normal operations grew into its own logistical task force to include services normally provided by a division support command, and needed much more support than normal. With the nature of operations in Afghanistan and having company or battalion command posts at firebases as well as combat multipliers and intelligence and medical assets, we needed many more MSE systems.

Our need to send immediate data and reports from firebases in constant contact was greater than the single-channel TACSAT with its limited data capability could supply. Small extension nodes and TSC-93 packages, which could be slung into remote sites, were used to support firebases. However, the amount of TSC-93s and SENs was inadequate. We needed smaller, dismounted packages for the remote sites. The 35th Signal Brigade was starting to put together Promina 100s with a UXC-60 for a satellite link to be put at all firebases to supply voice, SIPRNET and NIPRNET capability. Later units will have to discuss how successful these packages were.

The SIPRNET ruled command and control at the TOCs. Besides the normal email traffic, SIPRNET was primarily used for web based distribution and immediate situational awareness using chatting. We posted every operation order, graphic, intelligence picture, fragmentary order and slide show to a web site. Each staff section had its own site to update and keep everyone current. Any person with a SIPR account could surf the battalion, brigade, corps or CFLCC web sites and gain situational awareness of the latest events, significant acts or operations.

Another newcomer was Internet Relay Chat. IRC is fairly common on the Internet but new to the military. mIRC is freeware that was developed with Windows in mind and was used throughout the theater to pass information immediately between all branches and units. Battle captains spent much more time monitoring mIRC than they did radios. It was immediate and everyone logged on received the message along with who sent it. However, the validity of some messages had to be checked – the first report isn't always the most accurate. This capability was a definite asset that should be sustained. You can learn more about mIRC at www.mirc.com.

The NIPRNET was key to morale of the Soldiers. NIPR was used for e-mail to home station as well as home and surfing the web. Army Knowledge Online accounts were the standard for soldiers who did not have NIPRNET e-mail accounts on the local mail servers. Everyone wanted a NIPRNET drop and an account that led to this having to be controlled in order to preserve what little bandwidth was available. Some crafty Soldiers were even caught subnetting their own networks off of one Internet Protocol address. The Air Force, weather units, Central Investigations Division, contracting office and supply support units also used NIPRNET, which became very important to normal business and keeping operations and supplies moving. NIPRNET was brought to firebases that had SEN and TSC-93 support by tunneling through the SIPRNET. A KG-175 tactical LAN encryption device was placed on both ends to encrypt the packets riding over the secure network. The KG-175s were very effective and easy to use. This piece of equipment was a great replacement for the high-maintenance Network Encryption System we had grown accustomed to fighting with during entire field problems.

As you can probably guess, all the data being passed took its toll on the limited MSE network. Local networks were built at both Bagram and Kandahar with fiber runs and commercial switches. This increased the bandwidth greatly on those bases while controlling what went out of the network. At Bagram, the amount of bandwidth even allowed for media servers where you could watch many movies or listen to many songs. The bottleneck was obviously getting off of those air bases. This was solved at Bagram with commercial switches and deployable Ku band earth terminals. 4Mbps pipes carried the IP packets off the base. At Kandahar and remote sites, we still relied on MSE to carry our data loads. 512kbps and 674kbps was adequate but made everything much slower than most people are accustomed. NIPRNET was pulled off a strategic tactical entry point through a FCC-100 over a TSC-85 satellite terminal. At 674kbps this link was hardly "Road Runner" quality, but it got the job done if the number of users were closely controlled. A DKET and commercial switch was in the works for Kandahar as well.

Operations in Afghanistan showed us very important lessons for our networks. First we need to have smaller packages available for remote locations. We need to be able to support several firebases without having to bring in a SEN and TSC-93 for each one. Units at remote locations for that long shouldn't be that isolated especially when they are constantly in contact. Second, we need more FCC-100s and/or Prominas. These had great capabilities in a smaller package. Along

Our need to send immediate data and reports from firebases in constant contact was greater than the single-channel TACSAT with its limited data capability could supply.

with that equipment comes the need for training. Third, we need more bandwidth for sustained operations. Small pipes are fine initially, but as more units bring their capabilities, more bandwidth is needed to support and sustain.

Our current equipment doesn't have the capability to support large bandwidths. Fourth, we need more training on commercially available technologies. Soldiers were asked to install switches they had never seen, terminate fiber they had never worked with and fix systems they had never heard of. Last, we need more phones. No unit had enough telephones to support what they were asked to support. Two-wire phones would have been a good option if we had been able to acquire the two-wire cards to populate our Line Termination Units.

Shown on this page and the facing page is the FBCB2 system.

Results of new systems

There were many systems tried and tested during OEF. These are some of the new systems that the 82nd used during our rotation and the lessons learned with these systems as well as older systems.

Iridium phones were widely used throughout the country. Apparently the government bailing out this company was a good idea and was extremely useful. Iridium phones were used by every agency, branch of service and contractor in the country. The lack of existing telephone infrastructure throughout the majority of the country made these phones very important. The system was reliable, fairly clear and available everywhere. On top of that, the government had very good rates, if you don't include the original cost of salvaging the venture. Secure sleeves were also available to pass classified information. Most of the time, these phones were the only link for some Soldiers at firebases for months to talk to their families.

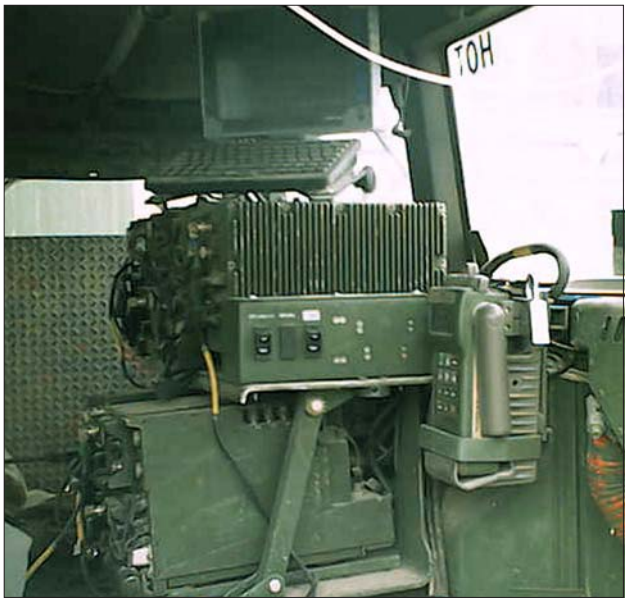
Another big success was the ForceXXI Battlefield Command Brigade and Below system. The FBCB2 was a system that included a monitor, keyboard, processor and transceiver. It provided situational awareness through a map on the screen showing your location along with the location of other units and any graphics. FBCB2 communicates over satellites and gives the user the ability to send messages to any other user in the network. These systems were mounted in vehicles and helicopters. TOCs could see a unit's movement, as well as, send messages to them for command and control or logistics. As Ground Assault Convoys became more common, this system was relied on more heavily. TOCs could track their movements. Supply messages were sent instead of tying up airtime on a command net. There were even several cases when the primary means of communications failed and the only means to communicate was passing messages over the FBCB2.

Mobile Transmitter was a system similar to FBCB2. The MTX was a system used for dismounts. It consisted only of a small box with an antenna placed on the carrier. Units with access to the Global Command and Control System feed were able to see the movement of the Soldiers. This system did not pass traffic back and forth. It only passed its location up. Initial problems receiving the GCCS feed prevented the brigade from using the system. However, special operations units used them routinely. The brigade was later able to pull the GCCS feed onto their Maneuver Control System-Light and see both the FBCB2 and MTX on the same picture.

The Global Broadcast Suite was used to pull the Predator feeds and CNN. We did not use the full suite of services. The system itself was very reliable and took minimal effort to maintain once it was working properly.

Voice over IP was also used minimally. Very few phones were available as well as only one server. The service itself was very clear but degraded quickly as the network got bogged down with its limited bandwidth. The KG-175s as mentioned before were very successful and required very little maintenance.

Armed Forces Network, although not a new system, was new to some of us maintaining it. The AFN is usually run by trained personnel but was put in the hands of untrained Soldiers at many remote sites. They soon had to become experts or suffer the complaints of fellow Soldiers hungry for a piece of back home and entertain-



ment.

Key drives or pen drives were hugely successful. They largely replaced disk drives as a transportable storage medium. Floppy 3.5 inch disk drives wouldn't last long in the heat and extremely dusty conditions in most locations. Key drives were easier to transport, held more data and every computer had a USB port. Unit Level Logistics System computers suffered the most without the ability to use the new storage medium.

The Gavin Gator was a concept to take a John Deere Gator all-terrain vehicle and mount communications systems on it. Single channel TACSATs, FMs and HF radios were mounted on the back with amps and a generator for power. The vehicle would then have the ability to be floor loaded in a CH-47 and brought to any objective with the Soldiers. This would give a mobile and stable C2 platform. This was an excellent concept mounted on the wrong vehicle. The Gators could not handle the loads. They became too heavy and would not make it up the smallest hills. They were soon left behind. The concept is still very good, but another vehicle is needed for transport.

Out of all the lessons learned, the most important went back to maintenance. A good maintenance plan for all equipment saved many outages. Scheduling times to bring down equipment and service them was tough but might have saved lives if outages would have occurred while lives were at stake. All communication and automation equipment had to be maintained and serviced in this hostile operating environment. Having a good plan up front saved our communicators from certain failure with equipment that was constantly used.

OEF proved to be a different operating environment for all Soldiers involved. Many communications systems used in training were pushed to their limits in this harsh environment operating for extended periods. While the importance of single channel systems proved itself again, the brigade and battalions came to rely upon the larger network for sustained communications. New relationships were formed, new equipment was used and new ways of doing business were successful within the Infantry brigade task force.

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He attended the Information Systems Engineering Officers Course and has a masters in telecommunications from the University of Colorado.

Acronym QuickScan

AKO – Army Knowledge Online
AFN – Armed Forces Network
ALE – Automatic Link Establishment
CFLCC- Coalition Forces Land Component Command
COMSEC – Communications Security
C2 – Command and Control
DAMA –Demand Access Multiple Assigned
DKET – Deployable Ku Band Earth Terminal
DSN – Defense Switched Network
FBCB2 – Force XXI Battlefield Command Brigade and Below
FM – Frequency Modulation
GBS – Global Broadcast Suite
GCCS – Global Command and Control System
HF – High Frequency
HPW – High Performance Waveguide
IP – Internet Protocol
IRC – Internet Relay Chat
LAN – Local Area Network
LOS – line-of-sight
LTU – Line Termination Unit
MBIITR – Multi Band Inter/Intra Team Radio
MCS-L – Maneuver Control System - Light
mIRC – Microsoft Internet Relay Chat – there is no official explanation of what the m stands for but most suspect it stands for Microsoft
MSAT – MBIITR Satellite
MSE – Mobile Subscriber Equipment
NES – Network Encryption System
NIPRNET – Nonsecure Internet Protocol Routing Network
OEF – Operation Enduring Freedom
SEN – Small Extension Node
SIPRNET – Secure Internet Protocol Routing Network
TAC – Tactical Assault Center
TACLANE – Tactical LAN Encryption
TACSAT – Tactical Satellite
TOC – Tactical Operations Center
ULLS – Unit Level Logistics System
USB – Universal Serial Bus
VDC – ViaSat Data Controller
VOIP – Voice Over IP

Media on the battlefield: 'A non-lethal fire'

by CPT David Connolly

Public Affairs and the media played a key role in Operation Iraqi Freedom. This operation proved that now more than ever, the U.S. military must be prepared to engage the media and provide timely, factual information. This article attempts to share some experiences with the media during Operation Enduring Freedom and the early stages of OIF. The intent is to explain, from a company/field-grade point of view, how media played a part in the operations and how our tactics, techniques and procedures related to current doctrine. Thoughts on how field-grade officers can prepare themselves to conduct media interviews in today's environment are shared. At this time, it is uncertain how doctrine will change as a result of our lessons learned.

From August 2002 to July 2003, I was assigned to 3rd U.S. Army, Coalition Forces Land Component Command as the media relations officer. During that time I supported OEF in Kuwait and Djibouti, Horn of Africa. My responsibilities included involvement in the planning and execution of OIF embed media initiative.

I am currently assigned to Fort Leavenworth in the Center for Army Tactics, U.S. Army Command and General Staff College. I had the opportunity to address students in an elective course, "Media on the Battlefield." The presentation was well received and many believed that some of the information should be presented for future use.

Introduction

Former Chief of Staff of the Army, GEN Eric Shenseki, once said that "If we do not speak for the Army others will." This is a very true statement. The media should be considered as a component of non-lethal fires/non-kinetic targeting, another tool at our disposal to help accomplish the mission. The media will write their story, with or without our input. It only makes sense to engage the media to ensure the whole story is told. The media is a venue in which we can pass along our command messages, which contain truthful and factual information. The bottom-line is that we should always keep in mind what we are there to do. Always remember the Soldiers, Sailors, Airmen and Marines who are on the ground sacrificing everyday. If we can help their morale and ultimately make their job easier by using the media, we should. It is safe to say that 99 times out of 100, we the members of the U.S. military, are acting with the right intentions. Meaning, we have nothing

CFLCC Public Affairs Officer, COL Rick Thomas, briefs members of the media near the Martyr's Monument in Baghdad.

hide. We have been given our orders and are attempting to carry them out within laws of land warfare. But bad things happen in war. Not everything goes our way. During these times it is best to confront the media and articulate to the world our side of the story.

When integrated and synchronized with Information Operations efforts, Public Affairs and in particular, the media, can be a force multiplier. In CFLCC prior to crossing the LD, the Public Affairs staff leveraged the Information Operation themes and messages to the fullest extent possible. It is important to understand the difference between IO and PAO, however. Basically IO and PAO belong to the same career field, Information Operations.

One difference is that IO can use deception and specifically target the enemy. Public Affairs must be aware what themes and messages that IO is pushing during each phase of the operation. The intent is to leverage IO. During the initial phases of OIF CFLCC always ensured that Public Affairs planners were involved in the Information Operations Working Groups. This ensured they were involved in the effects targeting board process. In that case, they could bring that information to the media director. The media director would then have a clear picture of what the commander's intent was and what the staff was attempting to accomplish.

Armed with this knowledge the media director could prioritize which of the thousands of media queries to work on while maintaining a level of fairness and equity to all reporters. As an example, prior to crossing the LD, IO was pushing themes to the enemy concerning capitulation. Knowing this, the media director could push reporters out to units responsible for dealing with large numbers of enemy prisoners of war. These type stories would send a message to the enemy and the world. The enemy would see how they would be fed, clothed and provided shelter. Capitulation might appear to be a good option given their current status. The world would see that we were trained and ready.

We should cooperate with the media within the limits of mission, safety and operations security. There is always a tendency to overclassify information to avoid speaking to the media. There are essentially two things you always want to protect: timing and intentions.

When integrated and synchronized with Information Operations efforts, Public Affairs and in particular, the media, can be a force multiplier.

Always ask if the information provided to the media will give an adversary something that they can use against us. If OPSEC or safety concerns make it impossible to support a media request, then simply tell them so. But remember that information is classified for a certain time period. Always remember timing and intentions.

How many times have you run across a document that was classified by the originator ten years ago? When reading the document you can't figure out why it is classified. Today's graphics may be classified, but once that phase line is crossed or the information can no longer be used against you, they probably are no longer a secret. You still must be responsible with information. The reporter should understand when he/she can write or speak about what is seen. We were successful during the decisive combat phase of OIF when reporters were allowed to access to command centers. The practice of allowing reporters in command centers is elaborated upon later when embedded reporters are discussed. This is always a sensitive area.

"Go ugly early" is a term sometimes used in public affairs. Bad things happen in war. Again, not everything goes our way. We had nearly 700 embedded reporters with units prior to crossing the line of departure. They saw and heard everything. There were many times when something bad happened and Soldiers were unsure how to respond when a reporter was on the scene. There was a case early on near the Umm Qasr area. Some civilians had been injured by coalition fire.

A CNN embedded reporter captured the scene as British and U.S. troops attended to the injured. Initially they shouted at the reporter to get back and not be "such a ghoul." Eventually cooler heads prevailed and they allowed the reporter to continue to film as long as he remained out of the way. The images of the Soldier's faces told the story. They were concerned that they had injured innocent civilians on the battlefield. Again, bad things happen. But the film showed that the primary concern at that point was to provide medical attention. The same care we would give to a coalition Soldier.

The embedded reporter had a right to be there to do his job, which was to report the activity. We could have gained more leverage by engaging the reporter (by way of short stand-up interview) with a leader on the scene who could have released known information and delivered a command message. The message could have included the sympathy for the injured and how we make every attempt to avoid these things from happening followed by basic, releasable facts that were known.

Coupled with the images, the world would understand the situation and not have only part of the story told or taken out of context.

Again, embeds will be discussed later. We must now, more than ever, be able to articulate our story on the spot without violating OPSEC. In order to do this, we must incorporate public affairs training at home station.

The best-case scenario is when Soldiers, Sailors, Airmen and Marines are the spokespersons, not the PAO. Again, it goes back to training. All soldiers must be prepared to answer questions pertaining to his or her area of responsibility. 3rd Infantry Division had the benefit of a great deal of training prior to crossing the LD. They were on rotation for Operation Desert Spring in the fall of 2002. We began what we called, "training embeds". We knew that if we went to war with Iraq we were going to embed hundreds of reporters like never before.

Reporters were embedded with units for three to four day periods. This gave the Soldiers an opportunity to get used to having reporters present 24/7 as they carried out their duties. They got used to the presence of reporters and learned how to deal with them. The reporters saw it all, the good, the bad and the ugly. The reporters also learned how to do their job in the harsh desert conditions. They began to learn how their equipment would work, how to move with a unit, etc.

The benefit from this experience was evident when they crossed the LD with the embeds. There were very few problems regarding the new relationship. Following the relief in place in Baghdad between 1st Armored Division and 3rd Infantry Division, we immediately began getting several complaints about reporters having their cameras taken and not being allowed to do their job.

This may have happened for several reasons. 1st AD did not have the benefit of the training embed program. It appeared that 1st AD had trouble initially dealing with the volume of reporters. Even though by this time, there were relatively fewer embeds, there were still hundreds of reporters present.

As stated earlier, training and experience dealing with the media weren't the only issues. Initially, we did not have a Coalition Press Information Center established in Baghdad. There were problems with reporters using press badges issued in Kuwait and attempting to get through checkpoints with them in Baghdad.

Preparing to conduct media interviews is a skill required of today's military members. There are two basic types of interviews to be prepared for: the taped, stand-up interview and the print interview.

There were two types of badges issued in Kuwait. One for embeds and the other for those who were not. The badges issued to non-embeds in Kuwait were not intended for use in Iraq. They were only to be used during coordinated opportunities through the Kuwait CPIC.

The decision on whether or not to badge is debatable. CFLCC made a conscious decision not to badge in Baghdad initially. Reporters knew their way around the city. They didn't desire or need PAO escort. At that time, they only needed information on where to go to cover certain activities.

On one hand, badges issued by the coalition at least show Soldiers on the ground that this person has at least been through some sort of formal registry process with the military. On the other hand, badges can be abused by reporters. Initially in Baghdad, they became the "get-into-every-checkpoint-free pass."

At this point, many reporters and affiliates were tired of having their freedom of movement dictated by the military. That is one reason they chose to leave their embed slots. In some cases, it was apparent that the reporters wanted a badge in Iraq to make moving around easier, not to be escorted or coordinate opportunities. Some of the reporters in Iraq had not registered through Kuwait previously. They wanted their "pass." Remember, this was very early after the fall of Baghdad.

As time went on and a CPIC was established, badges could once again be issued and controlled. We failed to predict the early mass exodus of embeds once a few statues fell down. Again, embeds are addressed later.

Preparing for interviews

Preparing to conduct media interviews is a skill required of today's military members. There are two basic types of interviews to be prepared for: the taped, stand-up interview and the print interview. During these types of interviews, no one hears the question, only the response.

Press conferences are usually reserved for those higher in the chain of command. Even at the CFLCC level, a decision was made not to conduct press conferences initially. It was known that Department of Defense would be conducting them in the District of Columbia and Central Command would conduct a daily press conference in Qatar. CFLCC had 700 embeds with units. There was no need to place a leader in front of reporters and have them attempt to articulate accurate timely information. Press conferences are unique in that the audience hears the question as well as the response. The preparation for all types of interviews remains essentially the same however.

Preparing for an interview is basically a negotiation. Stress to the reporter the need for information before you begin. Remember, the media can be a non-lethal fire. Ask yourself what the story can do for

your unit, the mission.

Think about what phase of the operation the unit is in. What themes and messages are IO pushing? How does this story help leverage them? Is this the right time to do the story? Remember to protect timing and intentions.

For example, in Kuwait prior to crossing the LD, maybe you don't want to do a story about how you are going to fight oil well fires. Don't give the enemy that information yet. After you cross the LD and have passed that phase, go for it. Many reporters will want "fluff" stories. Those are fine, but given the choice, prioritize stories depending on what phase of the operation your unit is in. If you haven't crossed the LD yet, a story about Soldiers training in the desert should be given emphasis over one about women in the Army. Remember, you can send a message to the world and the enemy that you are trained and ready. You can do a story about women in the Army, or whatever requests a reporter has, later. Be polite, honest, helpful and friendly to journalists, but remember the mission and Soldiers on the ground. How can you help them?

When preparing for an interview, do what is done preparing for other military operations; gather intel. Ask questions like "what is the story about?" Know what angle the reporter is after? What aspects of a subject are they after? Who else are they talking to? You may have to augment information they are already getting. Sometimes, if you know who they spoke to previously you may have to refute information. How knowledgeable is the reporter on the subject? What do they know about the military? You may have to educate them. What type of stories does this reporter typically write? Are they pro- or anti-military? War? Gather background information on them, get their bio.

Ask the journalist to send you his/her questions. They won't give you everything, but look for the focus. Facts may need to be gathered from the rest of the subject-matter experts on the staff to help articulate our side or the rest of the story. Remember, you want the media to walk away with the whole story and message. Asking for questions also helps to prepare for what might be asked during the interview. Sit down and brainstorm every question you think might be asked, especially, hard ones. What question do you *not* want to be asked and be unprepared for? You need to have a response for all questions.

Military leaders must be aware of what is being said to avoid their intended message being taken out of context.

If you can't do the interview tell them why. More times than not, they will understand. For example, in Baghdad a CBS crew got wind of what they thought was an effort to find a pilot downed in the 1991 Gulf War. CFLCC would often get off-the-wall requests like this, but after some investigation, it was learned that, in this particular case, it was true; a team was in fact, investigating the whereabouts of missing Navy CMDR Michael Scott Speicher. For obvious reasons (timing and intentions), they could not do the story at that time because it would jeopardize their investigation. After a meeting between the CBS crew and investigating team, agreements were made to wait until such time as the information could be released without detriment to the investigation.

Never get out in front of the President or DoD. Know what senior leaders are saying about the unit's operation. This helps you anticipate questions. Another term, "PAO (PAG) by transcript." Is sometimes used. If you have access to the Internet, review recent DoD transcripts. Chances are the same questions will be asked at your level. You don't have to regurgitate the SECDEF's responses, but you can ensure that your messages are in line and focused on how things are from your foxhole.

Military leaders must be aware of what is being said to avoid their intended message being taken out of context. For example, if the President said yesterday "there are indications that foreign fighters are involved in conducting these attacks" and you say, "We have no indications of foreign fighter involvement." It would appear that you are not on the same sheet of music. If you knew what the President's statement was, you could re-phrase the response to more accurately articulate your message.

Maybe, in your specific area of responsibility there are no indications of foreign fighters. The President is speaking for the entire country. You are talking about your AOR, however large or small it may be. You could have said, "In our area, there are no indications…" This way, you can attempt to avoid be taken out of context. Just being aware is the start point.

Know current events. If doing an interview tomorrow, what happened in the news today that relates? How does that event impact what you are going to talk about? Remember, you are the military to some journalists no matter what the topic. Stay in your lane and speak only about what you know about.

Conducting the interview

The interview itself is all about control. You want it, the reporter wants it. You have to learn how to structure effective answers and control the interview.

Don't be question driven, be message driven.

The trick is to use your messages as guideposts and not repeated

phrases. This is where the skill comes in. Everyone gets annoyed when they see someone on TV who sounds like a robot continuing to press rewind and play over and over. Those people lose credibility and appear never to actually answer anything. Some people can transition and flow well, some can't. It takes a certain amount of preparation and experience. You are not conducting an interview just to play stump-the-chump with a reporter. You should try to articulate command messages that will positively influence the outcome of your mission. Use the media as a non-lethal fire.

Help raise the morale of that young E-4 on the check point. If you have the information, and it is releasable, by all means give it. But consider what other information you need to deliver to tell the rest of the story.

For the purpose of this article, the focus is on stand-up, taped interviews where the question is never heard. This is a situation many of us will more than likely be involved in.

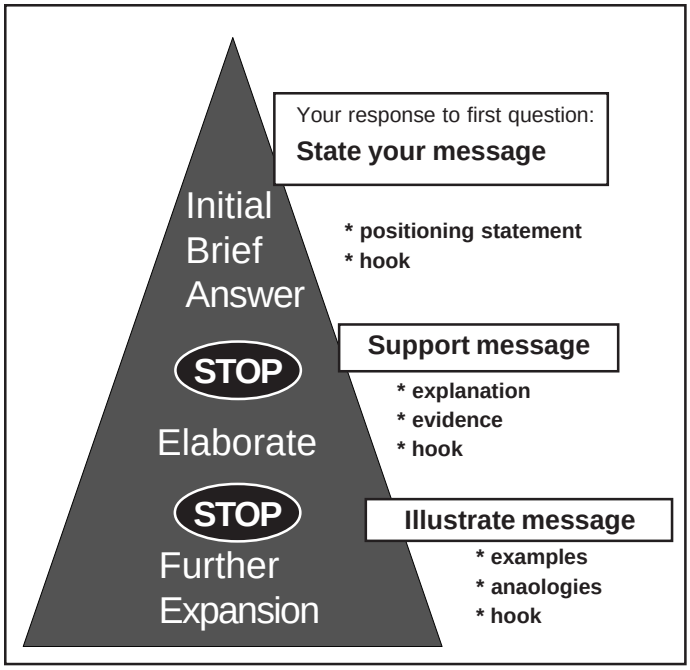
Structuring effective answers:

As stated previously, you are engaging the media not only to respond to their questions, but also to deliver a message about your mission that is important for the world to understand. Again, constantly ask yourself how you can help the soldiers on the ground by providing information to the media. To do this, you need to structure effective answers or responses. Come to the interview with about three or four messages to deliver. Think of each message as a pyramid.

State your message:

At the top of the pyramid you should state your message. This is your response to the first question. And for a taped-standup interview, it doesn't mater what the question is. Deliver your most important message first. So, if interrupted later, it is already out there. Nobody will hear the question on a taped interview.

Many times even if a journalist came to you with a specific question in mind, if you deliver a clearly articulated message, they will use it. You may tell them something that they didn't know. It may look and sound so good on tape that the affiliate's editors desire to use it as their sound bite.



For the many skeptics out there that will say this would never work, here is an example. Memorial Day was a bad day. The coalition had some incidents in and around Fallujah. A number of Soldiers lost their lives. About this time it was already clear that the media was tending to focus on things that went wrong, almost ignoring many details about the good things that were continuing to happen. Daily they would receive two news releases filled with facts and statistics about recovery and security. Yet, if one ambush or fatality occurred, that was all the public heard about. Who knows the reason why, you can probably guess; maybe it was sensationalism, politically driven from their bureaus, whatever.

The CFLCC Commander, LTG David McKiernan was painfully aware that this was happening as well. After the evening battle update assessment he was providing the staff with guidance. He told them that they must all become a public affairs officer and get this message out. He asked the staff, "What did we come here to do?" After a short silence, he started talking about the mission's objectives; removing the regime, searching for and eliminating weapons of mass destruction, etc.

His basic message was "We are not done yet." We were only weeks into what we knew would be a long, tough campaign and it was important to him that the world knew this. We were prepared to hunker down and would expect that these weren't the first or the last casualties we would endure.

The CG was back in Kuwait at this time. As the CFLC media director, I was watching the battle update assessment from our van in the EECP in Baghdad. At this time, we still didn't have a CPIC established. I usually would meet reporters at the Baghdad convention center and attempt to field their queries. So, I knew the next morning what the focus of their queries would be. I knew what the CG's message was. I, as a PAO, normally would not go on camera, but when it is important, it doesn't hurt. I didn't have time to prepare or even have access to a commander or key leader. I did have a coalition partner with me, a lieutenant colonel from the Australian army, but they still weren't talking to the media at that time.

It would have been nice to have him go on camera and articulate this message. Bottom-line was

that time was of the essence and I had what I had. Me and my notebook where I scribbled notes as the CG spoke. Early the next morning one of our Marine PAOs and I finalized a position statement, based directly from the CG's comments and ran it by my boss, the CFLCC PAO, who said go for it.

The first call came from Associated Press Television, I think. (A worldwide audience, perfect.) They called me and asked, "What happened at Fallujah?" They wanted a talking head and I wanted the CG's message heard. I said come on down, I'll give you a standup. They did and asked what happened at Fallujah. I gave my statement and never mentioned any facts of any specific incident at Fallujah. They quickly said thanks and packed up and ran. They wanted to be the first, the exclusive. Next came CNN, Reuters, all with international audiences. Only one, Reuters, asked the follow-up "Ok, got that, but can you tell me what happened at Fallujah."

By now everyone was running the position statement, the rest of the story, the message. They needed and wanted the rest. Which I then gave because I had the information and it was releasable. The important thing is that the world heard, first thing in the morning, what the CG wanted them to hear.

You'll be glad to hear that I took my share of trash talking from most of the staff that day, "Hey there's Hollywood." But more importantly, everyone remembered where he or she heard those words. "Isn't that what the CG said last night?" Exactly! My point is that it doesn't take a PAO to do this. Anyone listening could have done the same thing. Being a PAO and having other good PAOs from our sister services and coalition partners around me helped accomplish the mission. Know what is important to your commander. Know the message.

Support your message:

After delivering your message, support the message. In the middle of the pyramid elaborate your position statement. Provide an explanation, evidence that supports the initial statement. At this point provide facts, key stats, description of a certain program, or a supporting argument or rationale. For example, if supporting a statement made about what you are doing in Western Iraq, talk about how many patrols conducted, the number of arrests made, The food and water delivered. If the position statement said that you are doing great and wonderful things winning hearts and minds, back it up with the facts that the media may have overlooked.

At the bottom of the pyramid expand. Illustrate your message here by giving a prepared example or analogy. If using the example above, tell them about a specific raid in one of the towns.

Be in control:

During this entire process the goal is to be in control of the interview. Get them to follow. Hook the reporter's interest. Be passionate about what you are talking about. Usually you can have a reporter follow you through one message or pyramid. The skill comes in when bridging to a second or third message. The goal is to smoothly transition to the message so you don't sound like an idiot or a parrot repeating things over and over. This takes practice and experience and sometimes a bit of charm. One key leader who comes to mind is Colin Powell. He uses textbook communication skills in delivering a speech, as well, as when talking with reporters. He transitions fluidly so the untrained eye/ear may not notice. The fact is, he effectively communicates his messages and avoids losing credibility by sounding like a robot. The need is to continually bridge back to your message. The hard part is to always be aware of which questions are out of your lane. The tendency is to attempt to answer any and all questions.

The key is to first think about what is being asked. If it's not for you to answer, transition back on track, "I don't know about that, but what I can tell you is…" or "DoD might have more information on that, but the important thing to remember is…" Control the interview. Flag or spotlight your message with phrases like: "First, let's clarify the facts…" or "Let's look at what is really important…"

The hook is a tool used to effectively control the interview. You want the reporter to follow. The pyramid states to briefly stop between your initial answer and elaboration. What that means is to offer a statement like, "You should have seen what happened yesterday.." or "We have this new approach…." Then pause briefly enough time so the reporter can ask, "Well, what's that?" I realize that this won't work that easily every time especially, with savvy reporters. But, you get the idea. You want the control.

Embeds

During the decisive combat phase of Operation Iraqi Freedom CFLCC embedded an unprecedented number of reporters. It is debatable whether or not this is the way of the future or not. It remains to be seen how the military will

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deploy embed reporters in the future. We may never embedded reporters in the numbers seen during OIF. The affiliates have a say in the issue as well. They need to commit to the resources the idea as much as anybody.

The notion of embedding from "beginning to end" never really materialized. Many reporters dis-embedded themselves for different reasons soon after arriving in Baghdad or shortly thereafter. Some left simply because they were exhausted, mentally and physically. They had seen a lot of action. And in some cases, seen fellow journalists killed or wounded.

Embedding during decisive combat was a good deal. They didn't seem to mind the structure and limited freedom of movement (between units). They enjoyed a certain sense of security, especially when facing many unknown circumstances. Once decisive combat was declared over, many journalists and their affiliates decided it was time to dis-embed. Some took pressure from colleagues who called them "turncoats" or accused them of losing their objectivity. They desired to go back to "real" reporting.

Embeds worked for us because many connected with the military. No longer did they report, "they just did this" rather they started saying, "we just did this." They became part of the unit. They saw that human beings who cared about their actions fought the war. They saw that even when things went bad, the military members went out of their way to do the right thing, many times at risk to their own safety.

Embeds saw things that we have been saying for years but could never really prove. They saw that we care about limiting collateral damage. They saw in command posts, hundreds of minds struggling all night over target lists and the effects of striking specific targets. They saw the amount of thought and work involved in deciding on each and every target. We didn't simply "carpet bomb" Baghdad or target every single power source. We took a look at each location to be hit and if striking that target would achieve the desired effect.

They saw Soldiers put their own lives in danger to save the lives of civilians on the battlefield.

There was a reporter from Associated Press who was embedded with the 3rd ID during the "Thunder Run" into the airport. This reporter was in a tank within the column and was given a headset. Every intersection was heavily defended. The roads were crowded with everything from uniformed enemy soldiers, to combatants in civilian clothes in technical trucks, to average citizens going about their business because they believed that the coalition was not there yet. The fighting was aggressive. Soldiers and leaders all were fighting outside the hatch with M16s, M4 and sometimes beating people off their vehicles with ammo cans.

Embeds saw things that we have been saying for years but could never really prove. They saw that we care about limiting collateral damage.

As this happened, lead vehicles were still passing information like "Blue car, bad guys with RPG, white car, family of four, let them go." The reporter simply could not believe this. You can tell someone about it, but unless you show them, they may never believe you.

Getting back to the future of embeds, there are two thoughts: One is that maybe, we are currently riding a wave of popularity with the media. We are in their favor, for now. Things may go back to a certain level of tolerance with each other. But what we have accomplished with embeds can continue. Many of the embedded reporters were young, 20 or 30 somethings. They were some of the best and brightest that their affiliate had to offer. They will someday be the leaders of their organizations. They may be the anchors, or key leaders who can advise the bureau chiefs on military related matters.

Already some who previously were relatively unknown, are working the weekend anchor slots. These reporters saw for themselves and have developed a certain understanding, respect and rapport with us that can continue for years to come.

Another thing we learned by embedding hundreds of reporters is that the rate of information had drastically increased. We didn't fully appreciate how much information would be out before it went through the official reporting chain. We still had to be responsible with information and not officially "release" it until it was confirmed and on the significant activities report. There was a lot of pressure to confirm things, which we simply couldn't on the spot. We had to accept that they were out there and let them report. We would still handle information in the same manner. Once it was confirmed we would acknowledge. If unconfirmed, we would either refute or simply state that to our knowledge, it didn't happen.

The way in which we released, or articulated information, had also changed. We now, more than ever, had to confirm the obvious. There was a young Soldier who apparently shot himself in a port-a-potty in one of the camps in Kuwait before we crossed the LD. We had just recently RSOI'd the embedded reporters in the units. When the release was written it stated something to the effect, "A Soldier has died from an apparent, self-inflicted gunshot wound to the head." CENTCOM asked why we chose those words.

We never used those words strongly speculating a suicide. True, but we never had a FOX reporter as

the first person on the scene either. The reporter heard the shot, was standing right there when the door was opened. One Soldier, one weapon, and a gunshot wound to the head. Apparently, he died of a self-inflicted wound. We didn't say that he killed himself. The investigation would reveal what happened. The point is that we all realized at that moment that the game was different. If we didn't confirm the obvious up front, we would have lost a certain amount of credibility.

I think it is useful to understand how embeds were deployed. For OIF it worked like this: DoD asked CFLCC how many reporters they could handle given the task organization. CFLCC worked with subordinate PAOs to work out specific numbers. CFLCC then provided DoD with a number. DoD took the number and allocated slots to specific affiliates and media organizations. Those affiliates and organizations assigned personnel to fill the slots. Not all the reporters assigned as embeds wanted the slot. Some had been in the AOR for months and benefited from the training embeds. Some had never been there at all. Between DoD and CFLCC the best attempt was made to ensure the right reporters and media types were in the right place. There was a mix of different categories of media spread out among the task force (print, TV, weekly magazines, regional/Arab media, etc). Subordinate commands had input if they desired a specific anchor or reporter to embed with their headquarters. Some had already built a good rapport with individuals through training. The DoD embed list assigned reporters down to division level. Divisions then pushed them down, at times, to company level.

Some are very passionate to disagree with letting reporters in command centers without a security clearance. It is safe to say that it was proven that we can do this without violating OPSEC by establishing strict ground rules while still being responsible with information. Some have said, "We give away too much about our capabilities by letting in civilians without clearances." One example given is that reporters learn too much about how far and fast we can go. We give this away by doing it. After we cross the LD and execute, everybody knows our capability. What we must protect are our TTPs and information that we will use again in the future.

Be conscious of what information you are providing and the situation at the time you are providing it. Once more, protect timing, intentions and anything that an adversary can use against us.

Just because a reporter is let into a command center doesn't mean that you show them every secret in the book. Be responsible with information. It is challenging, but do-able. Again, we need to get away from the tendency to over-classify while still protecting sensitive information that should remain classified even after the current fight is over.

It is a balancing act that requires thought. Tomorrow, today's graphics and basic plan or concept of the operation may no longer be sensitive but some of the tactics, techniques and procedures required to build them still need to be protected. Security at the source requires that each individual understand the difference. Be conscious of what information you are providing and the situation at the time you are providing it. Once more, protect timing, intentions and anything that an adversary can use against us.

Ground rules:

All reporters who desire access to our forces are required to sign ground rules whether they are embedded or not. Most will abide by them because they want to continue to have access to our forces. Enforcing the ground rules is sometimes difficult. As mentioned, once embeds were pushed down to the units, before you knew it, there was some poor company executive officer who had the additional duty of "babysitting" a reporter. Security at the source was the rule. It became impossible to watch a reporter 24/7.

It was especially dangerous when reporters had satellite phones and the capability to go live at any moment.

Geraldo Rivera is a prime example. He went live on air and basically violated everything you would normally protect; timing, intentions and things an adversary can use against you. He was embedded with the 101st while they were on the move toward Baghdad. He scratched out a sketch in the sand that showed their formation, where they were, how far and fast they had traveled and when they would be at their next location.

V Corps immediately notified CFLCC and asked to pull him, which was CFLCC initiated. The 101st, who did not have the benefit of live television was upset because, "He was their man."

Say what you will about Geraldo, but he is great for morale. That was apparent even when he came to Kuwait for a meeting on Camp Doha pleading for a late embed slot. Even lieutenant colonels and colonels would light up at the site of him. He was a nice break from endless hours of nagging staff work and operation orders.

Not many reporters drew that sort of reaction. His incident with the 101st was an example of the difficulty in watching a reporter 24/7. He was eventually pulled, knowing he would go back because the division wanted him back, after a heartfelt apology, of course. Luckily, it did not appear his actions

ever got anyone killed.

Units can always add to ground rules that reporters sign with the higher headquarters, in this case, CFLCC. One good one would be to instruct the reporter never to go live unless there is a Soldier or "handler" present. This would have worked well in the Geraldo situation.

Depending on the reporter, they may have good intentions and just not realize that a certain piece of information may be sensitive at the time. Remember, reporters are just like Soldiers, in that there are good ones, bad ones, experienced and inexperienced ones. You have to work to train them and set the standard of conduct.

No ground rule is foolproof. If it is in writing, we must live with it. One of the CFLCC ground rules stated that no image or photograph would be taken of a deceased coalition Soldier. LTG McKiernan felt strongly about this ground rule. He did not want family members to learn of their loved ones' fate in the media. There was much debate with DoD on whether or not it should be a ground rule.

Army Times had a photograph of a young 101st Soldier who was badly wounded and was being carried by his comrades. He later died. The first reaction to *Army Times* was, "You can't run that photo, it violates the ground rules." They took the position that were not violating a ground rule because the Soldier was "dying" and at the time of the photo was not dead. Even after CFLCC and the Soldier's family pleaded that they not run the photo, they did.

Historical note:

We dis-embedded four journalists and two photographers, because the intent of the ground rule was on publication of the photograph. This was obviously an editorial position taken by Times Publishing. As a result, all Times Publishing employees were dis-embedded for one week. DoD did not re-embed them, CFLCC did.

To be fair, one of the journalists and one of the photographers were leaving anyway. Of the remaining three, we allowed one to go back to a unit. It was not the person who took the photograph. The other recourse that was taken was to have the paper publish a letter to the editor from McKiernan. Not so effective since they did not have to print his last line, which stated that he and hopefully nobody he ever associates with ever buys another copy of the *Army Times*. So, even when you think a ground rule is self-explanatory or simply in good taste, be sure if they are in writing to articulate your intentions in detail.

Dealing with media effectively requires training and experience like anything else. You won't personally like every reporter encountered. Put personal feelings aside and get on with the mission and allow them to do theirs. When encountering the media, always ask yourself how to use this non-lethal fire to help accomplish the mission and most importantly, how to assist the Soldier on the ground at the checkpoint or on patrol.

CPT Connolly was assigned from August 2002 to July 2003 to the 3rd U.S. Army, Coalition Forces Land Component Command as the media relations officer. During that time he supported Operation Enduring Freedom in Kuwait and Djibouti, Horn of Africa. He was then involved in the planning and execution of Operation Iraqi Freedom in Iraq including the embedded media initiative. Connolly was a member of CFLCC's Early Entry Command Post, which entered Baghdad, Iraq on April 10, 2003.

Following his tour in 3rd Army, Connolly was assigned to Fort Leavenworth at the Command and General Staff College. During that time, he was afforded the opportunity to instruct some of the CGSC students during the C401 (Media on the Battlefield) portion of the course.

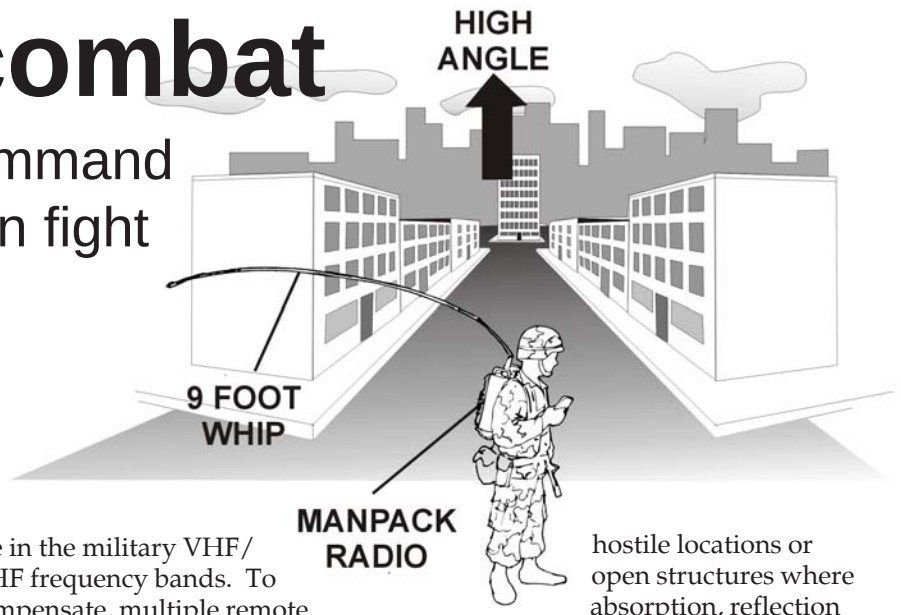
Prior to be assigned to Third Army, Connolly was assigned to the United States Army Recruiting Command, Fort Knox, Ky., as the Public Information officer (October 2000-August 2002).

Acronym QuickScan

AD – Armored Division
APTN – Associated Press Television
BUA – battle update assessment
CFLCC – Coalition Forces Land Component Command
CGSC – (U.S. Army) Command and General Staff College
CPIC – Coalition Press Information Center
EECP – Early Entry Command post
EPW – Enemy Prisoner of War
IO – Information Operations
IOWG – Information Operations Working Groups
LD – Line of departure
OEF – Operation Enduring Freedom
ODS – Operation Desert Spring
OIF – Operation Iraqi Freedom
OPORDS – operation orders
OPSEC – Operational security
RIP – relief in place
RSOI – Reception, staging, onward movement, integration
SIGACTs – significant activities
TTPs – tactics, techniques and procedures
WMD – Weapons of mass destruction

AN/PRC-150 HF radio in urban combat

– a better way to command and control the urban fight



by retired LTC David M. Fiedler and LTC Edward Farmer

Communications in the urban environment

Using Army standard-tactical-radio communications systems on urban and complex terrain has never been very easy. Inherent equipment limitations found in military radios (low power levels and inefficient antennas) coupled with system degrading effects inherent in the urban setting such as signal absorption, scattering and diffraction present many challenges for the combat-net radio user operating with the current suite of military frequencies (2-512 MHz).

Civilian police, fire and municipal service agencies have faced these same challenges for many years. The classical answer has been to position retransmission stations (repeaters) at strategic locations on the urban area of operations. By placing repeaters intelligently (usually atop high structures) and by selecting power levels and antennas with good coverage patterns city governments have long been able communicate among base-station, hand-held and vehicular radios pretty well. As far back as the 1930s the radio frequencies employed by civil government were in the same general very-high frequency/ultra-high frequency range used by many of today's military radios. Recently, in order to relieve frequency congestion and bandwidth availability problems, many urban centers have migrated to much higher frequency ranges where scattering, reflection and absorption are worse than they are in the military VHF/UHF frequency bands. To compensate, multiple remote repeaters connected to transmission hubs are used to improve coverage over wide areas or into hard-to-cover spots. Network repeaters are connected to command stations (trunked) over telephone cable, fiber-optic cable or microwave carriers and typically assure maximum reliability, area coverage and user access to the civil networks.

Modern cell-phone networks now also operate in this same general frequency range. Each "cell" access point (antenna tower) is positioned for direct (radio line-of-sight) connectivity to subscriber-cell phones located in their coverage area. The access points are interlinked with additional infrastructure including switches and tie lines.

These systems work well in the civil-urban environment because the system designers have the luxury of controlling the infrastructure and major-system parameters such as power levels, antenna locations, number of access points and repeaters. If a "dead spot" is discovered it is usually a simple matter to engineer and interconnect additional repeaters or cells to eliminate it. In addition, most civil-radio and cell-phone communications are directed to subscribers in relatively open non-hostile locations or open structures where absorption, reflection and other signal-propagation losses are a factor that can be dealt with. When operation becomes marginal users can simply step outside or move closer to a building window etc. and operations will normally improve as a result of improved line-of-sight signals to the repeater or cell access point.

It's different with the Army…

When the Army is engaged in urban-combat operations the communications situation is considerably different from the situation faced by civil government or cell phone users. Military difference factors include:

1) operation restricted to the frequency range of common military radios (2-512Mhz),

2) limits on the output power of military radio equipment,

3) limited number of available repeater assets if any,

4) limited access to good repeater locations due to enemy action,

5) need to communicate to both outside street locations and inside structures,

6) lack of standard compact antenna systems useful for urban combat,

7) severe restrictions on the

movements of system users,

8) lack of manpower required to cover multiple signal sites can easily exceed available resources. And more.

… but there are ways …

Fortunately, there are new equipment and techniques available in the force that can, if intelligently applied, overcome many of the communications limitations created by urban combat. One of these is the use of the lower portion of the HF radio spectrum.

Near Vertical Incidence Sky-wave

For many years the Army has known that radio signals in the lower portion of the HF frequency spectrum (2-8Mhz) when radiated at near-vertical angles shower down off the earth's ionosphere (a atmospheric layer of electrically-charged gases at an altitude of approximately 200 miles) in an omni-directional gap-free energy pattern with a radius of hundreds of miles. This transmission technique is called Near Vertical Incident Sky-wave because the signal energy is launched mostly on high (toward the sky) angles between 45 degrees and the zenith and returns to earth after ionospheric reflection. The returning signal comes down from above at high angles in an omni-directional pattern that has no gaps and a radius of hundreds of miles.

While in the past the Army was primarily interested in NVIS for covering theater/corps size areas of operations NVIS is also very useful on the urban battlefield. The advantage of NVIS signals for urban combat is simply that most of the radio energy after ionospheric refraction is not bent, blocked or absorbed by the urban environment in the way that surface wave (low angle) signals from vertical antennas would be. NVIS signal losses are limited to only free space path loss and some absorbs ion at the ionosphere reflection point. Because of this, a Soldier with the Army's new AN/PRC-150 HF man-pack radio (see *Army Communicator* Winter 2001) and the correct (horizontal) antenna (see *Army Communicator* Fall 2002) can easily receive these high-angle signals if located in open areas between urban structures such as streets, parks, roof tops and other open urban places. The communications path is from the transmitting antenna to the ionosphere and on to the receive antenna. Transmission losses remain fairly constant at around –120 db (a number that can be overcome easily with our equipment) over the entire area covered by the signal. The NVIS signal pattern is truly omni-directional even at very short distances and this makes the transmission mode useful for urban fighting as well as wide area and long distance communications.

HF and structures

Because of their longer wavelengths (lower frequency) HF (2-30Mhz) signals will naturally penetrate urban structures more deeply than signals on higher, shorter wavelength frequencies. How deep the penetration depends on exact frequency, signal power level, antenna efficiency and the makeup of the urban structures in the path.

The name of the game in all radio communications and particularly urban combat radio communications is overcoming path loss. Simply put, the greater the radiated signal and the lower the frequency the more path loss can be overcome. This raises the probability of successful communications in urban areas and inside buildings. Stated mathematically, and greatly simplified:

$$Path\ Loss\ (PL) = 20\log\left(\frac{4\pi d}{\lambda}\right) + K_{\lambda}$$

π is the well-known constant, d is the distance between transmitter and receiver, l is the wavelength at the operational frequency, and Kl is a power loss constant determined by characteristics of the obstructions in the signal path at the wavelength of the operational frequency. For grounded solid-metal buildings without windows etc. K is a very large, meaning that path losses cannot be overcome in order to communicate. For wood and tarpaper structures still found in many urban environments K becomes very small so the first term in the equation predominates. Brick and concrete structures increase K but not to a level where communications fail more often than not. Most structures are inherently (and surprisingly) fairly radio-transparent at HF frequencies. As an example of HF signal penetration it is not uncommon for a small ground penetrating radar transmitter operating in the HF frequency range to penetrate over 100 feet into common kinds of earth while the same power radar on a higher frequency will penetrate much less.

What does this equation mean in practical tactical communications terms? It means, for example, that if we are using a common VHF military radio operating at 30Mhz (lowest frequency for single-channeled ground-to-air radio systems etc.) and replace it with an HF radio like the AN/PRC-150 operating, at say, 5Mhz the path loss drops by 20 decibels (db) because of the way that longer wavelength (lower frequency) signals propagate. In this case lowering the frequency is the equivalent to increasing the power of the transmitter by a factor of almost seven.

Another important consideration for urban combat is raw power. Obviously, the more power you have the more path loss you can overcome and the deeper your signals will penetrate into structures. Common tactical VHF man-pack radios like SINCGARS have a maximum output power of four watts. The AN/PRC-150 HF radio has a maximum output power of 20 watts. That is 7db* more signal power to overcome losses caused by the path, path obstructions, inefficient antennas and other signal consuming factors. Yes the extra power will help you but power relationships are tricky,

look at the table below:

4 watts = 36 dbm*
20 watts = 43 dbm*
50 watts = 47 dbm*
150 watts = 52 dbm*
400 watts = 56 dbm*

dbm* = decibels above a miliwatt. The db* is a logarithmic unit used to describe a ratio. The ratio may be power, or voltage or intensity or several other factors but in this case it is power (watts). If you do the math you will see that you can measure the difference of two power levels by taking 10 log of their power ratio. If the ratio of power is, for example, two, meaning one radio transmitter is double the power of the other then the difference is 3db. Put another way, for every 3db gained by making a more efficient antenna system or cutting transmission line loss etc., is the equivalent to doubling the transmitter power.

The point here is that often, adjustments to antenna systems or operational frequencies to make an antenna more efficient can produce far more dbs of signal power than simply increasing the raw transmitter power. More power will always help overcome path loss for both NVIS and ground wave systems but many times it is not the best or only answer. If you are already operating at the maximum power that the transmitter can produce then these adjustments do become the only way to compensate for path loss and improve signal penetration in the urban combat environment.

Think "system"

Communications between two radio stations requires that the transmitter power – transmitter antenna gain – receiver antenna gain – receiver performance overcome the path loss between stations. A low-power outstation radio such as a man-pack radio with an inefficient antenna used by forward troops can be "compensated for" to a degree when communicating with a base station that is typically using a higher performance receiver and a more efficient antenna. When the path is reversed, the typically higher-power base-station transmitter and the more efficient antenna again compensates for lower performing combat unit radios in the net. Communications between low-power outstations is much more difficult and may even require retransmission (relay) through a more efficient base station.

In the urban fight, man-pack small unit HF radios, such as the new AN/PRC-150 are extremely portable, but are antenna and power challenged. A high degree of portable NVIS (sky-wave) effect can be obtained when needed by simply physically reorienting standard vertical man-pack or vehicle (whip) antennas to the horizontal plane (see Fig. 2). Direct (surface wave) signals are simpler to generate and use inside structures are also produced from the same antenna by just leaving the antenna vertical.

Communication between two stations by either NVIS (sky-wave) or surface wave transmission only requires that the path loss between them be overcome by the radios and equipment at the ends. Surface wave connectivity while simple to produce is often more difficult to achieve when there are signal robbing surface path obstructions. Surface obstructions can be eliminated under some conditions if the path chosen is sky-wave (NVIS). Do not however rule out the use of surface wave (low angle) signals as a transmission mode in urban combat.

A large station such as a fixed or mobile tactical operations center has the opportunity to erect more efficient antennas and operate more powerful radio equipment thus compensating for some of the system limitations encountered when trying to communicate with typical low powered radios (usually man-packs) carried by combat troops. Highly efficient, large, horizontal-wire antennas are fine for fixed or at the halt, company and higher command-post locations. CPs, have more freedom to select good communications sites even on the urban battlefield. Base-station equipment can make up for much of the system losses caused by having to use low power man-pack radios with inefficient antennas at the fighting locations. The decision to use high-angle or low-angle transmission mode is the call of the combat unit Signal officer. This decision must be made based upon and a knowledge of antennas and radio propagation.

Generally, if the fighting is in the streets and from rooftop to rooftop, C2 elements can standoff from the battle area and control the fight using high-angle (NVIS) communications. If the fighting is inside structures and masked from high-angle signals the C2 element may need to get in close and pump

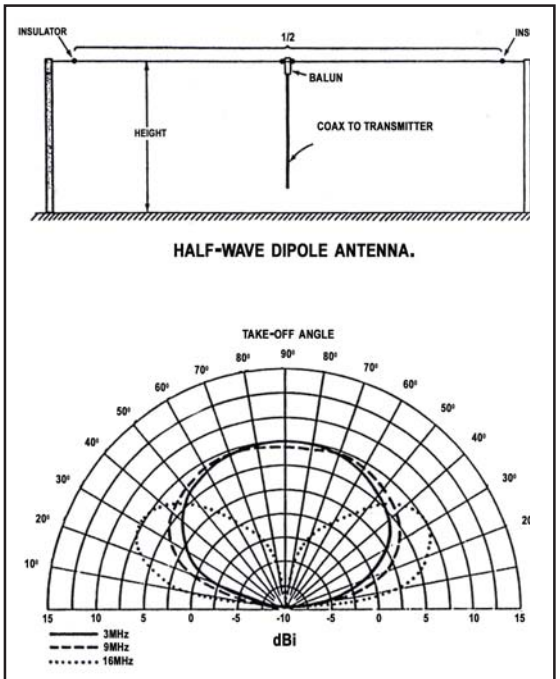


Fig. 1 Horizontal dipole antenna pattern 8 meters above ground. Note that at the lower (NVIS) frequencies, the bulk of the radiated energy is on angles between 40 and 90 degrees.

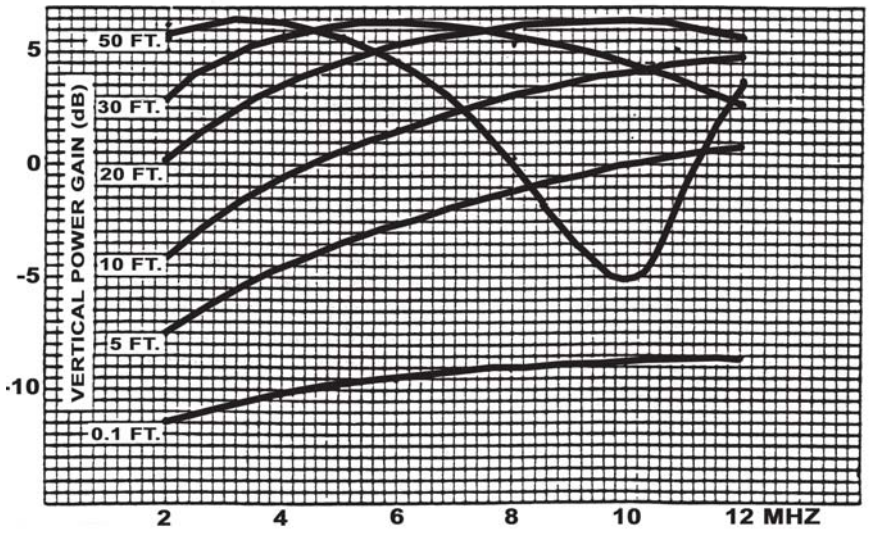


Fig. 1a Vertical power gain at various heights across the NVIS frequency band.

signal energy directly at structures being attacked using vertical (low angle) whip antennas.

A C2 HF base station

High-angle NVIS signals can be easily generated from simple horizontal wire dipole antennas located close to the earth (see Fig.1). The best performance at NVIS frequencies occurs when the antenna is about ¼ wavelength (about 30 feet at 8 mHz) above real ground. The desired gap-free omni-directional antenna pattern shape remains constant, but with markedly reduced signal strength, even when the antenna is lowered to ground level (see Fig. 1a).

A good base-station antenna is critical because it helps the path loss in both directions however, when the tactical situation is such that it is not possible to erect an antenna at the ideal height a lower height will not shut the circuit down. This is true of length also. Perhaps the ideal antenna for a tactical CP base station is the inverted "L" (see Fig. 3a and 3b).

This antenna is efficient if it has the correct dimensions and produces both high angle horizontal polarization for NVIS communications and vertical polarization for compatibility with man-pack and vehicular vertical antennas using low angle (ground-wave) signals at the same time (see *Army Communicator* Fall 02 for discussion on polarization). It is important to note that mixing polarization in Line of Sight ground-wave nets (cross polarization) will cause a huge (20db+) amount of signal loss. Inverted "L" antennas avoid this problem simply because they provide efficient signals with both polarizations in case someone doesn't get the word. Comparing Fig. 1 (dipole) and Fig. 3 (inverted "L") shows the magnitude of the signal difference in the vertical (NVIS) direction when compared to a standard horizontal dipole (Fig. 1).

This loss that is small and is the price paid for generating both high and low angle signals from the same antenna. Inverted "Ls" do need some room to be operated at peak efficiency. Ideal lengths for 35 foot vertical elements are shown below:

frequency range (MHz)	horizontal length (feet)
2.5 – 4.0	150
3.5 – 6.0	100
5.0 – 7.0	80

shorter lengths to match tactical situations will also work but antenna efficiency again will be somewhat reduced.

Portable antennas

The AN/PRC-150 is normally equipped with the OE-505 10-foot vertical monopole whip antenna. Even at ten feet, this is a very "electrically short and inefficient" antenna (an ideal quarter-wave whip at 5 MHz would be 47-feet long). It is normally operated using only the radio loosely coupled to surrounding earth as its counterpoise (radio frequency ground system needed to complete the antenna circuit). This is a very inefficient arrangement compared to what we easily achieve at base stations through the use of balanced antennas (dipoles) or ground radial systems for vertical antennas.

When the fight enters buildings even the ten-foot whip becomes impossible to use. With the full realization that a still shorter antenna will have even lower efficiency than the OE-505 we are left with the requirement to find one. Fortunately, the AN/PRC-150 includes an excellent antenna tuner capable of electrically matching the radio impedance to extremely short antennas, so choices are available.

Physically shortening an OE-505 is an obvious approach, but there's an even better answer that does not destroy the OE-505. The AS-3683 3 foot metal tape antenna that comes with the AN/PRC-119 SINCGARS radio (the most common radio in the Army) will fill this bill perfectly (see Fig. 7). In addition to having a less than 3-foot long radiating element that is short enough to take into a building and stay vertical (the predominant orientation for troops moving inside buildings), the antenna base is a flexible "goose neck" that can be easily bent horizontal for man-pack NVIS operation when the situation permits.

There are some other things we can do to improve the performance both of these admittedly short and inefficient antennas. Operators need to remember that man-pack anten-

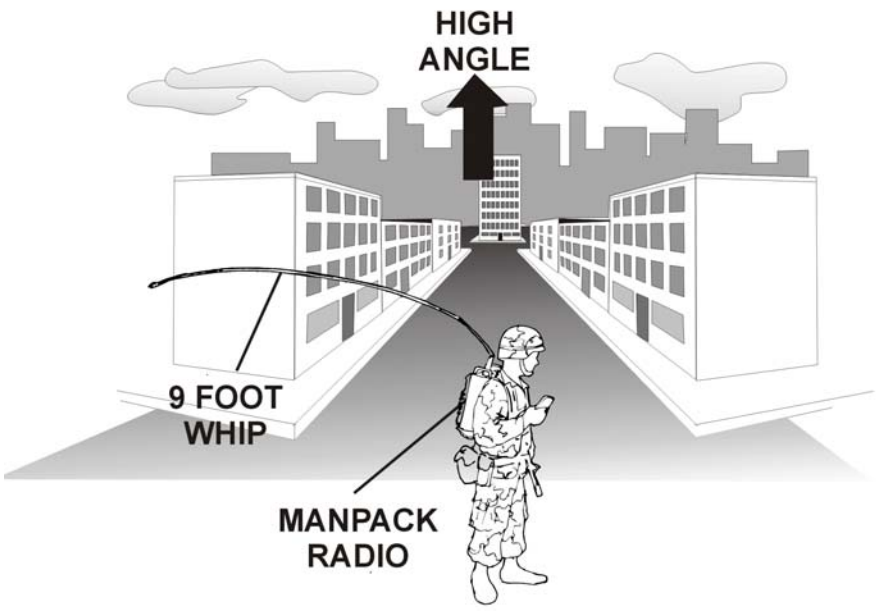


Fig. 2 Man-pack vertical (whip) antenna bent horizontal toproduce high angle (NVIS) horizontal dipole like antenna pattern.

nas really consist of the whip (radiating monopole) and what ever is under the whip. All antennas have two sides, and when used in the standard way, the man-pack antennas other side (called the ground plane or counterpoise) really consists of the radio chassis, the operator's body, and whatever the soldier is standing near at the time the radio is operating. Improving the counterpoise/groundplane can provide a tremendous improvement in radiated power and received signal level at almost no cost.

A much better counterpoise in the urban situation is simply a "tail" (see Fig. 6) connected to the radio's ground terminal and hung behind the operator. The longer the tail is the better. Making it about the equal length as the AS-3683 (1 meter) works well in terms of both electrical performance and practicality. Any conductor will do, but the more surface area the better, and copper works better than materials with higher resistive characteristics. The best "tail" construction that we have found is a simple section of computer ribbon cable shorted on both ends with one end terminated on the equipment (chassis) ground. This "tail" can dramatically increase the effective radiated power from the antenna. When possible, removing the radio from the operator's back will also improve the signal strength since the body will no longer serve as a signal robbing capacitive path to ground. While on the ground, a ground rod and at least four wire radials spread out and connected to the radio ground can produce even greater signal power.

Can it ever get better than this?

This looks great but don't rush off just yet to replace the VHF radio in your squad with an HF man-pack radio. Why? The antenna again! See Fig. 5. The path loss equation above only describes what happens once a signal has been radiated – not how the signal gets generated. You must remember, to radiate at top efficiency a monopole (whip) antenna should be physically ¼ wavelength (λ) long, and it also needs an extensive low impedance counterpoise. At HF frequencies that is physically a very large antenna. All small antennas suffer inefficiencies.

As an example of how efficiency is reduced as the antenna gets shorter and antenna impedance is mismatched to the radio, look at Fig. 5. Fortunately, modern HF equipment such as the AN/PRC-150 are equipped with a very effective antenna matching unit that is quite capable of providing acceptable antenna electrical impedance matching even to very short antennas. Unfortunately, while the coupling process electrically compensates for a physically short antenna it also reduces effective radiated power of the radio as shown.

The AN/PRC-150 has some additional tricks to help make up for this…

In addition to the higher power levels and better physical

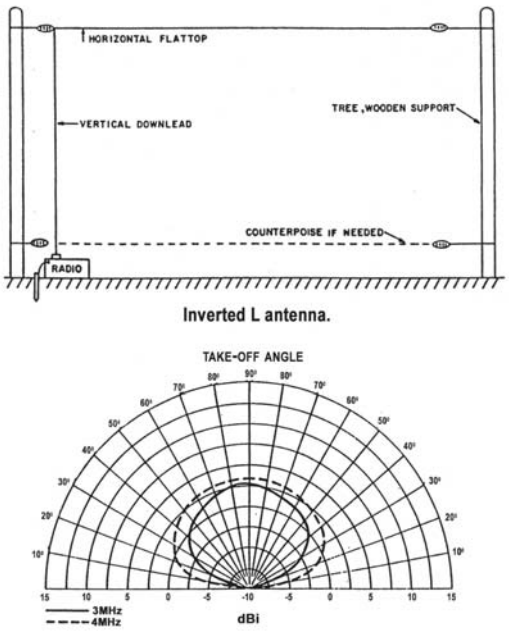


Fig. 3a Typical inverted "L" horizontal antenna pattern generated by the horizontal part of the "L" note high andgle (NVIS) energy pattern.

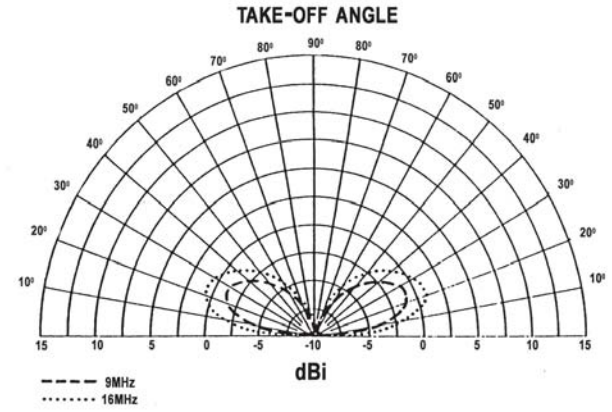
signal penetration capabilities of HF radio the AN/PRC-150 has other ways to make back signal lost in the path and the inefficient antenna. The U.S. government (NSA) along with private industry has developed and adopted a new form of digital voice modulation coding called Mixed Excitation Linear Prediction.

MELP implemented in the AN/PRC-150 can operate at both 600 and 2400 bps data rates. MELP has demonstrated an ability to provide a significant increase in secure voice availability over degraded channels particularly at the 600bps data rate when compared to other digital and analog forms of voice modulation. The MELP speech mode uses an integrated noise pre-processor that reduces the effect of background noise and compensates for poor response at the lower speech frequencies. By using digital voice techniques such as band-pass filtering, pulse-dispersion filters, adaptive-spectral enhancement and adaptive noise pre-processing voice communications performance over channels with low signal-to-noise ratios typical of the urban combat environment can now be made useable and reliable.

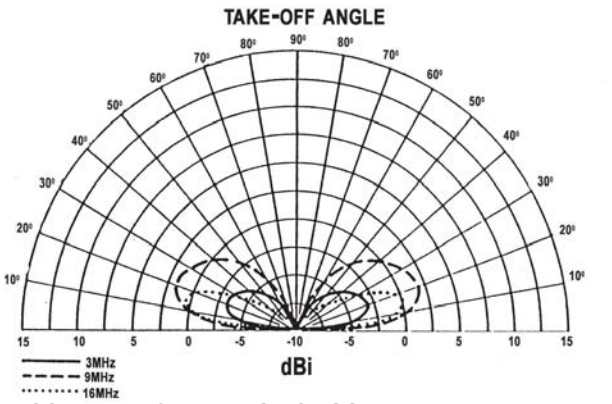
The MELP capability just like lowering the frequency, using higher power, and improving antenna efficiency translates into dbs of "processing gain" and a better capability to communicate over urban terrain. In effect MELP is compensating for path loss and antenna inefficiency.

The signal-to-noise channel characteristics needed to support various modulation modes are shown in Fig. 8. Note that MELP 600(bps) digital voice performs almost as well as a CW (manual Morse Code) expert operator. Quite an achievement since until recently all services tried without success to keep a pool of trained CW operators available because CW Morse Code could get through under conditions that would support no other means of communication. A good look at Fig. 8 also shows this. Analog voice communications is achieved at a S/N ratio of about 12-to-1. Good MELP 600 digital voice communications is achieved at about a ratio of 3-to-1. The ratio of the two modes means a 4-to-1 improvement in communications by going to MELP 600. From the signal power prospective, this is an increase of 6 db (equal to four times the transmitter power) due to gain from digital signal processing. Viewed another way signal gains of this magnitude effectively make a 20 watt radio into the equivalent of an 80 watt radio at the push of a software button but without causing increased stress on radio components that would normally require higher (more expensive) power ratings, and decreased operational life of the radio batteries.

Also shown in Fig. 8 is a digital voice mode identified as Last Ditch Voice. This mode as the name implies is designed to work when nothing else even a manual Morse CW expert will. LDV takes advantage of digital voice processing at a much lower data rate (75bps) in order to slash digital errors caused by marginal conditions. LDV is not a "real time" transmission mode but LDV has both a broadcast and an automatic-request-for-retransmission capability. Voice data packets are created and sent in the transmitting radio. The radio then sends the packets at a very slow data rate using sophisticated error detection and correction digital coding techniques. Data packets are stored in the receiving radio and checked for errors in transmission caused by poor transmission path characteristics. In ARQ mode an automatic request to retransmit corrupted packets can be returned to the transmitting radio in the event to many packets have too many errors for decoding into useable voice communications. In broadcast mode all packets are stored upon receipt the first time. Radio software then assembles the packets and cues the operator. The soldier at the receiving radio then plays the message like a voicemail. The lower data rate and extensive signal processing can produce impressive performance since LDV can recover signals from below the noise levels (see Fig. 8). This again can be equated a considerable increase (perhaps 3db or



Fifteen-foot vertical whip antenna pattern.



Thirty-two-foot vertical whip antenna pattern.

Fig. 3b Typical inverted "L" vertical antenna pattern generated by the vertical part of the "L" note low angle (groundwave) energy pattern.

double) in transmitter power.

To summarize, S-6s and G-6s should consider the following points that make the Army's new family of HF radio a better way to communicate than other means for urban combat if:

1 – Lower signal loss and better penetration into buildings due to propagation characteristics of lower operating frequency.

2 – Higher raw transmitter power to make up for signal losses in the path and due to inefficient antennas.

3 – Lower signal loss through heavy foliage, rain and snow because of longer wavelength.

4 – Lower transmission line losses.

5 – Eliminates need for hard to place and tactically dangerous repeater stations.

6 – Less effected by complex terrain.

7 – Better performance (effective power gain) due to MELP 600 DSP.

8 – Last Ditch Voice digital mode for recovery of extremely weak signals.

9 – Ability to use both sky-wave and surface-wave paths depending on the tactical situation.

Make no mistake; tactical communications under urban combat/complex terrain conditions is sometimes a very hard thing to do. G6 and S6 officers will need to know how to pick an antenna, mode of transmission, and frequency band that will provide the key to success. Much depends upon the skill of unit Signal officers. Using our new HF equipment can help get the message through. Communications planners at every level need to understand the concepts of propagation, path loss, antennas, antenna couplers and digital signal processing as outlined. When they do the chances of getting critical C2 information to all echelons of an urban combat force via HF-CNR will be much better.

Note: At this time, the number of HF radios in the force is not overwhelming. There will be situations where there just is no AN/PRC-150 or other HF man-pack radios around to use in the urban fight. In this case we will have to fall back on existing stocks of VHF/UHF radios like SINCGARS or AN/PRC-126, or the new commercial-off-the-shelf CNRs that are now appearing in significant numbers such as the AN/PRC-117F (man-pack/vehicular) and the AN/PRC-148 (handheld). The principals outlined above such as using the lowest frequency at VHF and improving antenna efficiency all still apply. Measures such as

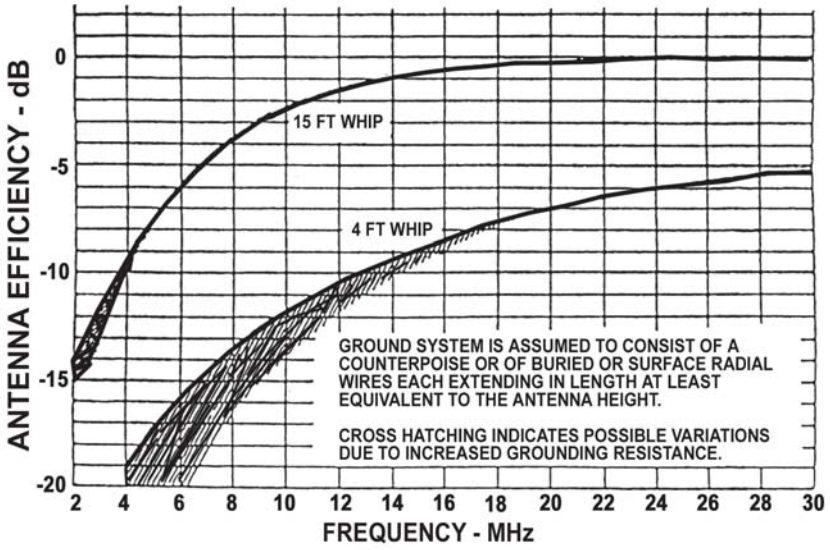


Fig. 5 Effect of shortening vertical HF antennas from 15 feet to 4 feet for convenient operation when in urban combat (6-9db). Shorter antennas will give even greater antenna losses. In addition, most radios will automatically cut output power as the antenna gets shorter.

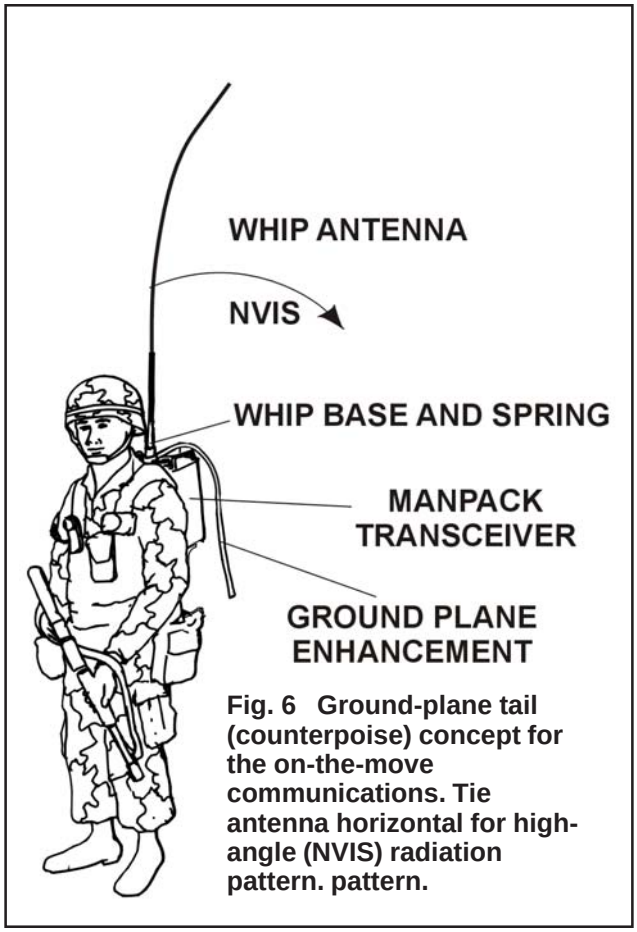
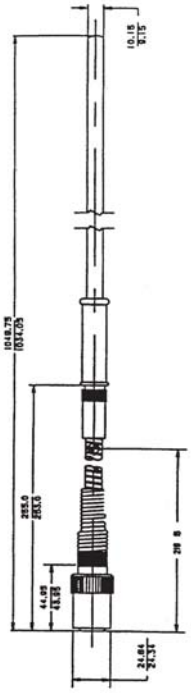


Fig. 6 Ground-plane tail (counterpoise) concept for the on-the-move communications. Tie antenna horizontal for high-angle (NVIS) radiation pattern. pattern.



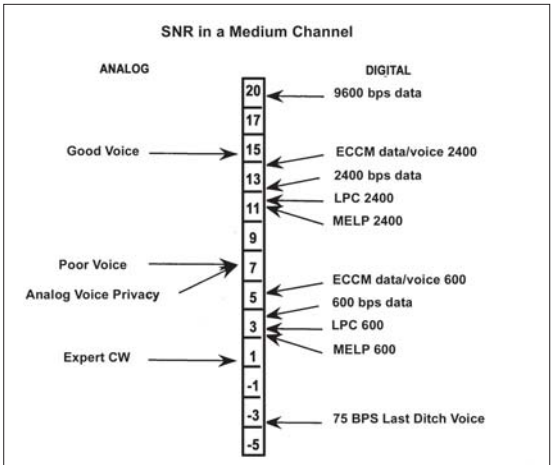


Fig. 8 Signal-to-Noise Ratios required for different AN/PRC-150 transmission modes. Note LDV recovers signals from below the noise level and MELP 600 operates well in a low S/N ration weal signal environment commonly found in urban combat environments.

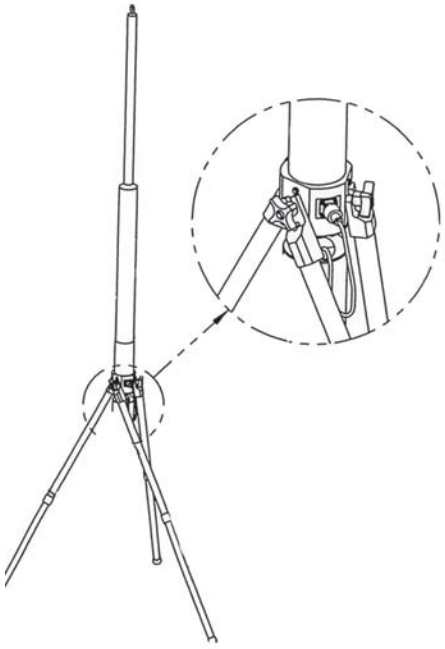


Fig. 9 COM-201 VHF (30-88Mhz) self-supporting ground-plane antenna. COM-201 can easily be brought forward for urban combat since it has a small self-contained package and requires no mast. Good low angle radiation and gain characteristics are a great help under urban combat conditions.

Fig. 7 AS-3683 SINCGARS metal tape Manpack Antenna with flexible gooseneck base that can be made vertical for ground-wave HF communications or horizontal for sky-wave (NVIS) communications. AN/PRC-150 antenna tuner/couplers will impedance match this antenna but efficiency will be poor. Antenna suitable for vertical use inside buildings. Use longer OE-505 if possible. Try higher (shorter wavelength) HF frequencies if possible for better efficiency.

providing antenna tails etc. will also help these radios to increase signal levels just like they will an HF radio and for the same reasons. NVIS of course will not apply since the ionosphere cannot reliably reflect high angle signals on frequencies above around 10Mhz or less. If forced to use VHF radios for urban combat there is yet one more thing we can do. Many units are now receiving the COM-201 free standing 30-88Mhz antennas that replace their old OE-254 bi-conical antenna. The COM-201 is an excellent 30-88Mhz vertical ground plane extended range antenna with a low takeoff angle and excellent performance characteristics (see *Army Communicator* Summer 2001). The antenna is designed to be lightweight, easy to move, and to stand on its own integral tripod/ ground plane. Due to this construction, it is a balanced antenna and therefore more efficient than any man-pack whip etc. The COM-201 can be brought forward and setup on the ground near to where C2 Headquarters are operating or even inside buildings. The combination of high antenna efficiency and low takeoff angle and the use of the lowest possible operational frequency will greatly improve the signal penetration probability for VHF surface wave transmissions. The COM-201 (see Fig. 9) can be connected to any 30-88Mhz radios in the inventory and because of its performance and portability is virtually the only thing in the VHF inventory that can improve standard VHF radio equipment operations in the urban environment. Unit Signal officers need to be aware of this antenna when only VHF radio is available to support units in urban combat.

Tactical communications using CNR in the urban environment is a hard but not impossible mission for small unit Signal officers. A little basic knowledge about current equipment capabilities and the critical factors of antenna and frequency selection will reduce the difficulty of urban combat communications to a much more manageable task.

To smooth this bump in our professional roads the smart unit Signal officer needs to learn a little, hopefully by reading this article (and other publications) and experiment a lot. Drag out those HF radios and antennas. Even the older ones that

don't have all the capabilities of the AN/PRC-150.

Try different antennas, power levels and frequencies etc. until you find the combination of things that work in your situation before you have to do it for real. The same goes for the VHF radios you have. Don't wait to go to the NTC, JRTC or the MOUNT site. The barracks and cantonment areas of major army bases are fine for getting ready to communicate in urban combat. They are just like cities and towns anywhere in the world. National Guard units have it even easier, in many cases all they have to do is get out of the armory and into the neighborhood! The Signal Center also needs to get in gear! Current doctrine, training materials and POIs on how to use CNR in urban-combat just don't have the detail required. Documented requirements for urban combat specific equipment don't exist either as far as we can tell. With the prospects of large-scale urban combat looming larger every day and the reality of Operation Iraqi Freedom with us now, we need to act!

Mr. Fiedler – a retired Signal Corps lieutenant colonel – is an engineer and project director at the project manager for tactical-radio communications systems, Fort Monmouth. Past assignments include service with Army avionics, electronic warfare, combat-surveillance and target-acquisition laboratories, Army Communications Systems Agency, PM for mobile-subscriber equipment, PM-SINCGARS and PM for All-Source Analysis System. He's also served as assistant PM, field-office chief and director of integration for the Joint Tactical Fusion Program, a field-operating agency of the deputy chief of staff for operations. Fiedler has served in Army, Army Reserve and Army National Guard Signal, infantry and armor units and as a DA civilian engineer since 1971. He holds degrees in both physics and engineering and a master's degree in industrial management. He is the author of many articles in the fields of combat communications and electronic warfare.

Mr. Farmer is a Vietnam-era Signal soldier and former lieutenant colonel in California's State Military Reserve, where he ran intrastate emergency communications. He's a graduate of USMC Command and Staff college. He's a professional engineer, has an extra-class Amateur Radio license and is president of EFA Technologies, Inc., in Sacramento, Calif. He has a bachelor's degree in electrical engineering and a masters in physics, both from California State University. He has published three books and more than 40 articles, holds four U.S. Patents and is a frequent guest speaker at communications and antenna-oriented conferences.

Acronym QuickScan

ARQ – automatic request for retransmission
CNR – combat net radio
COTS – commercial-off-the-shelf
CP – command post
db – decibels
DSP – digital signal processing
JTRC – Joint Readiness Training Center
LDV – Last Ditch Voice
LOS – line-of-sight
MELP – Mixed Excitation Linear Prediction
MOUT – Military Operations on Urban Terrain
NTC – National Training Center
NVIS – Near Vertical Incident Skywave
PL – path loss
OIF – Operation Iraqi Freedom
RF – radio frequency
SINCGARS – single-channeled ground-to-air radio system
S/N – signal to noise
TOC – tactical operations center
UHF – ultra high frequency
VHF – very high frequency

Mobility favors small antennas:

small-loop high-frequency antennas

by retired LTC Edward J. Farmer, P.E.

Heinz Guderian had an unusual perspective on the essential roll of communications in maneuver warfare, and how it could be achieved.

In our modern suite of communication options, high-frequency radio has the unique property of requiring no infrastructure. A complete voice and data radio station is easily man-portable and capable, with proper use, of communicating with any other spot on earth.

When the German army was developing the doctrine that became Blitzkrieg it was obvious from the outset that a paradigm shift in communications was essential. Heinz Guderian, the architect of "Blitzkrieg" said, "I want to command over the radio from the front, not talk about it in the rear on a telephone." Since he was originally commissioned as a signal officer and spent much of his career with issues related to staff organization and communication, he had an unusual perspective on the essential roll of communications in maneuver warfare, and how it could be achieved.

A complete HF radio system is easily man-portable, but performance improves with the size of the antenna – and a full-size antenna can be over a hundred feet long. Mobility favors small antennas, and the "holy grail" of HF antenna research is a physically small antenna capable of "full-size" performance. One of the notable efforts along the way, but certainly not the holy grail, is the small loop.

Fig. 1 General Heinz Guderian commanding from the front over a radio, circa 1940.

Small-loop antennas have been around for a very long time. While opinions vary as to whether the antennas were loops or top-loaded monopoles, the German army in WWII fielded a number of scout and command vehicles with loop-like antenna structures. Probably the most famous is Erwin Rommel's command vehicle, as seen in Fig. 2.

Fig. 2 General Erwin Rommel's WWII command vehicle showing a loop-like antenna structure.

The idea of a loop antenna comes from the realization that radiation field is the space integral of antenna current over distance. Long antennas with low current produce the same field intensity as small antennas with high current. The problem becomes designing a radiating structure that promotes the flow of very large radio-frequency currents. The obvious "cut-to-the-chase" answer is, "make a closed loop." If the loop circumference is fairly small its radiation resistance will be small. Because such a structure will be inherently inductive there will be some inductive reactance opposing current flow, but it can be easily eliminated by adding some series capacitance to form a series-resonant circuit. In such a situation, the net reactance is zero and the resistance is the radiation resistance plus the loss resistance of the loop, both of which are very small — perhaps even less than an ohm. This "short circuit" promotes the flow of huge currents and therefore the possibility of large fields from physically small structures.

As the circumference of the structure increases, so does the radiation resistance. Also, the phase of the antenna current in one place is sufficiently different from the phase of the current in another that the radiation pattern becomes a strong function of the frequency of operation, and the expected performance only occurs near the design fre-

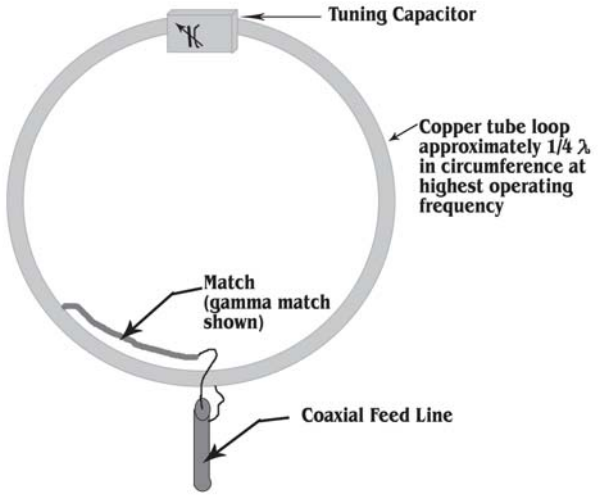


Fig. 3 The components of a small loop antenna suitable for military applications. Variations in configuration are possible, but one way or another, all the elements shown are required. Tuning the loop is a separate issue from tuning the radio to the feedline – the tuner in the radio is not suitable for both – a loop-tuning system of some kind is essential, hence the need for the tuning capacitor.

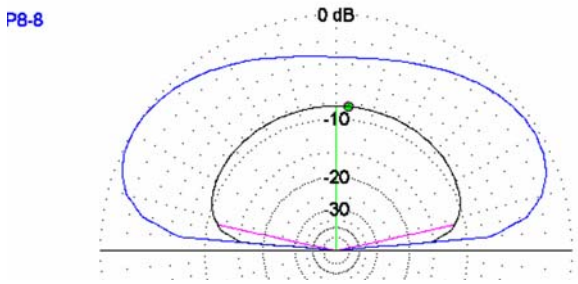


Fig. 4 – a vertical small loop cut for a high frequency of 8 MHz with patterns shown for 2 MHz (inner trace) and 8 MHz (outer trace). Note the NVIS-compatible pattern at both frequencies. In this case there is about 5 dB difference in vertical gain although there is more than 10 dB difference in gain at lower angles.

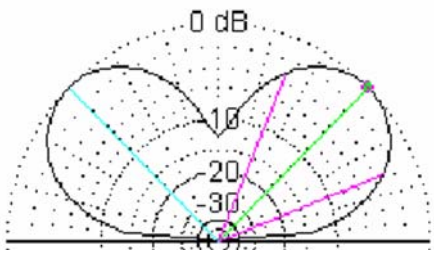


Fig. 5 – The pattern for a horizontal small loop includes an overhead minimum which reduces NVIS effectiveness, but what's missing in the overhead is radiated at lower angels useful for ground wave or long-haul paths.

quency. This causes such a loop to behave more like the linear antennas with which we are more familiar. A classical "full size" loop has a circumference of one wavelength at its intended operating frequency, and isn't especially useful for military purposes.

The "small loop" term is usually reserved for closed-loop antennas in which the current around the loop is more-or-less in-phase, so the loop antenna can be treated as a magnetic dipole. This criteria limits the antenna to a circumference of about ¼-wavelength at the highest frequency at which it is to be used. Also, it becomes harder and harder to match a radio to a small loop as the frequency increases – the feedpoint impedance becomes quite large and extremely reactive. Matching a radio to a small loop is one of the very interesting engineering challenges of loop antenna engineering.

The components of a small loop are shown in Fig. 3.

The advantage of a small loop, at least at the high end of its frequency range is that it provides gain and patterns very similar to what one would expect from a full-size (1/2-wavelength) dipole at the same frequency. This is a huge advantage – a physically small, lightweight, easy-to-deploy antenna that provides about the same performance normally obtained only after three Soldiers do 15 to 30 minutes work erecting masts and stringing wire.

There are two significant limitations. First, loops are sensitive to objects moving in their vicinity (near field) so re-tuning can be a frequent requirement.

Second, as frequency decreases from the size-defining highest frequency so does efficiency. While a loop will theoretically operate at any lower frequency the efficiency decreases so significantly that practical issues restrict it to about an octave (2:1 frequency range), so the lowest frequency is generally assumed to be about half the highest frequency. While the antenna's pattern remains the same as frequency decreases, the loss in efficiency dramatically reduces the gain. At the lower frequency the loop's gain will be down by about 10 dB from what it was at its highest frequency.

This effectively converts a 100-watt radio at the higher frequency to a 10-watt radio at the lower one, and relegates the performance to something more equivalent to the commonly used vehicular whip antennas than it does to a full-size dipole. This does not however eliminate the loop from one of its most important military applications, that of a small vehicular on-the-move antenna. It does require that care be taken in trading off antenna size, radiation efficiency, and transmitter power.

Loops can be arranged with the plane of the loop vertical or horizontal. Both give satisfactory performance for modern land HF combat communications. The horizontal configuration produces more lower-

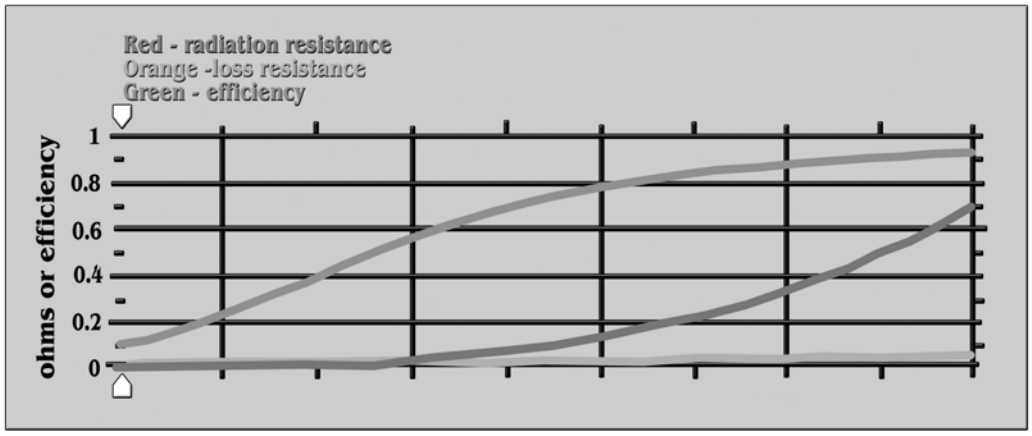


Fig. 6 The graph shows radiation resistance, loss resistance, and efficiency of a 30 MHz small loop over frequency. Note that while efficiency is good at the upper design frequency it becomes less 50 percent just below 15 MHz.

angle radiation useful for long distance (low angle) communication and surface wave (ground) LOS systems, at the expense of the near-vertical radiation required for NVIS (near vertical-incidence skywave) operation. NVIS is the most useful mode for operation in theater/corps-size areas so many of the world's armies (ie. Russia, China and Norway) have opted for this orientation.

The gain and pattern of a vertical small loop is shown in Fig. 4, and a horizontal small loop in Fig. 5.

Understanding efficiency is the key to understanding and effectively using small loops. Assuming the loop-tuning mechanism balances the inductive reactance of the loop itself with the capacitive reactance of the tuning capacitor, then the feedpoint impedance of the loop is the radiation resistance plus the loss resistance. In all radiating structures, radiation resistance increases with length, so we would expect the radiation resistance to be pretty small.

A common relationship for the radiation resistance of a small loop is:

Rr = 197 [Circumference / Operating wavelength]4 (eqn 1)

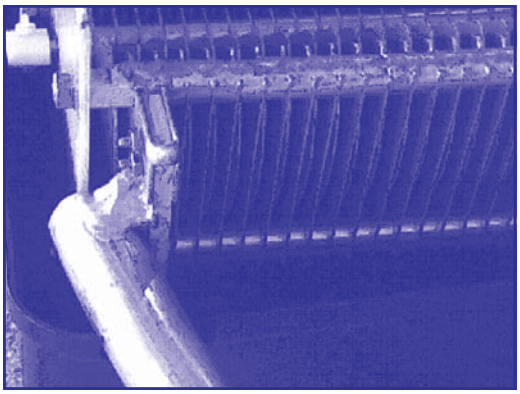


Fig. 7 – Shown here is the tuning capacitor from a commercial small loop. Note the welded construction intended to minimize connection loss, and also the large spacing between plates. This loop can tune down to about 12 MHz. Lower frequencies would require more plates or larger plates. Higher power radios would require more spacing between the plates.

If the loop circumference is ¼ wavelength the radiation resistance is about 0.77 ohms – about a hundredth that of a full-size dipole – but then that's necessary to get the very large loop currents we're after.

If radiation resistance is the "good" resistance (that representing the conversion of applied radio frequency energy into radiation field) then the "bad" resistance is the "loss resistance." It includes the skin-effect resistance of the loop conductor plus the resistance of all joints and connections. If the connections are kept to a minimum and well-made the main loss is in the tuning capacitor and in the skin-effect resistance of the loop material itself. It is crucial the loop be made of a highly conductive material, and that it be large in cross-section. Assuming the loop is copper, the relationship for skin-effect loss resistance is:

Rs = 9.96 x 10-4 * "f * S / d

Where R is in ohms
f is the frequency in MHz
S is the circumference in feet
d is the conductor diameter in inches

Note that loss resistance changes as the square root of frequency, while radiation resistance changes as the fourth power of frequency. As frequency decreases from the loop's upper design frequency the radiation resistance decreases as the fourth power of frequency while the loss resistance decreases much more slowly. Efficiency is calculated as:

Efficiency = Rr / (Rr + Rloss)

Which decreases as the 3.5th power of frequency. This is why efficiency falls off so badly near the bottom of the frequency range. This is much easier to visualize on a graph. These data were computed for a loop designed for operation up to 30 MHz and the results are plotted in Fig. 6.

Fig. 8 (Above) A Russian tank with a guard-rail-like small loop. Note the plane of the loop is horizontal.

Fig. 9 (Left) A Russian communications vehicle with two vertical loop elements.

Fig. 10 (Below right) An Israeli army vehicle with two half-loop elements. The vehicle structure completes the loop. This is a somewhat primitive research and development effort by Chelton in France. Using the vehicle as part of the loop is not without challenges. The loss resistance of the vehicle will be much higher than copper or aluminum conductor (the resistance of steel is more than six times that of copper), and the effect of the high radio frequency currents on vehicle components and equipment requires evaluation.

There are two other issues. The first is bandwidth. A radiating structure involving very low resistance and very high reactance is the definition of a high Q circuit, and such circuits have very narrow bandwidth. This means the tuning capacitance will have to be adjusted with even the smallest change in operating frequency.

The second issue is the tuning capacitor itself. It must be adjustable over the required range of values for the specific loop design, and must withstand the substantial voltages (easily several thousands of volts) that appear across it. In the case of "simple" air dielectric variable capacitors (see Fig. 7) this amounts to large spacings between the plates, which, to achieve the required capacitance, involves very big plates.

There are alternatives to air variable capacitors, the two common ones being vacuum variable capacitors (although the large glass enclosure makes them somewhat fragile for military purposes) and discrete component capacitors that are switched in and out of the circuit as needed. The switches have to withstand the very substantial r.f. current flows. One such switch is made by Kilovac Corporation and amounts to a vacuum relay. Even though fairly small (2-inch diameter) these relays are rated for 25,000 volts and 30 amps making them appropriate for most loop applications.

Whether the tuning capacitor is a rotary (air or vacuum variable) or made of individually switched components operation is much easier if adjusting the loop tuning capacitance for loop resonance is done automatically. This requires some kind of specially designed automatic loop tuner. Such equipment exists and is available in one form or another from loop antenna manufacturers. It is critical to mention, however, that the antenna tuner in a commercial radio probably isn't going to do loop tuning more than once. The high current and especially the high voltage dramatically exceeds the design parameters of these commercial tuners and the odds one would survive loop operation are extremely small. Military tuners and radios will have a somewhat better chance, but the real answer is a purpose-designed loop tuning system.

While there are some challenges with the successful design and application of loops it has been done quite successfully since well before WWII. The following photographs illustrate some more contemporary applications.

Mr. Farmer is a Vietnam-era Signal soldier and former lieutenant colonel in California's State Military Reserve, where he ran intrastate emergency communications. He's a graduate of USMC Command and Staff college. He's a professional engineer, has an extra-class Amateur Radio license and is president of EFA Technologies, Inc., in Sacramento, Calif. He has published three books and more than 40 articles, holds four U.S. Patents and is a frequent guest speaker at communications and antenna-oriented conferences.

Acronym QuickScan

CNR – combat net radio
GHz – gigahertz
HF – high frequency
JTRS – Joint Tactical Radio System
LOS – line-of-sight
MHz – megahertz
NVIS – Near Vertical Incidence Skywave
Ohm – unit of electrical resistance
R&D – Research and development

HF combat net radio lesson learned again

by retired LTC David M. Fiedler

Recently, at the 2003 Signal Symposium and prior to that in his testimony to the Congress, LTG William "Scott" Wallace, former commanding general of V Corps during the invasion of Iraq, made the following statement about the command, control and communications situation during the Iraq fight. "Despite the introduction of battle-command-on-the-move capabilities that I enjoyed in my assault command post, the vast majority of tactical leaders and CPs (command posts) enjoyed few on-the-move capabilities. Most were tethered to a CP and largely dependant upon line-of-sight communications.

"Case in point. At the corps level the G2 could see individual fighting positions defending a critical bridge because we had a UAV (unmanned-aerial vehicle) leading the lead formations. But we could not get the data down to the unit who was taking the objective because all the CPs were moving. It was a deliberate attack at the corps level, but a movement to contact at the battalion level," Wallace said.

This statement upsets me greatly both as a student of military art, science and history; and as a Signal professional with over 35 years service in all components of the U.S. Army. Wallace's statement when reasonably analyzed can only lead to the conclusion there was a failure in both communications planning and communications execution. The means to provide what Wallace needed (beyond–line-of-sight-on-the-move communications) certainly exist today in our widely deployed family of high-frequency combat net radios and has for many generations. Why then were we not able to improvise, and adapt our existing resources to overcome Wallace's communications problems?

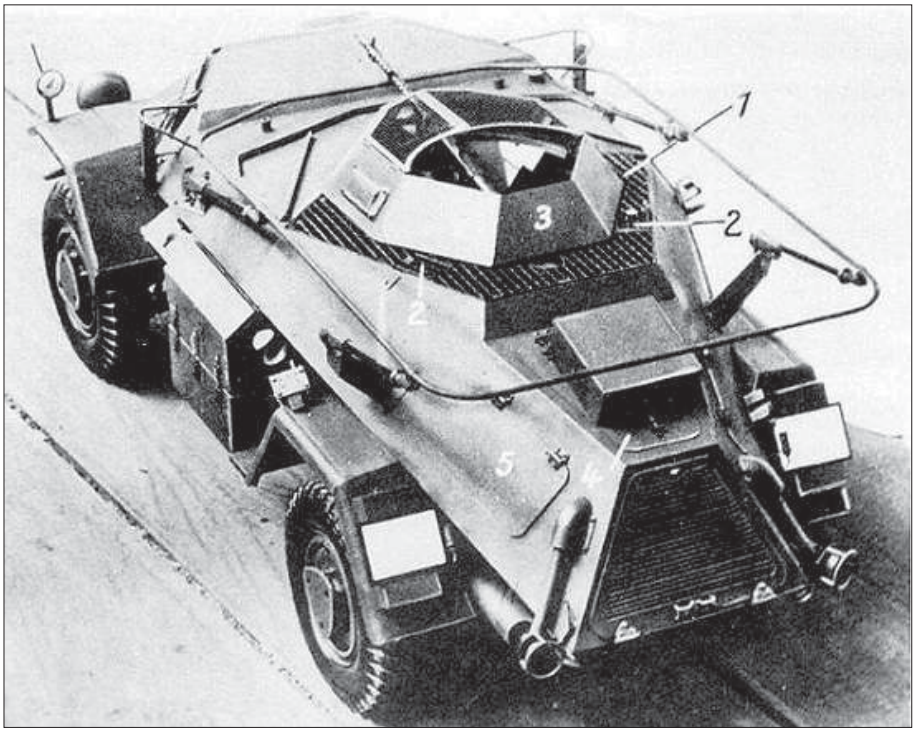


Fig. 1 Sd.Kfz-223 wheeled communications/liaison vehicle circa 1935 used for ground to air coordination. note the "frame" (horizontal loop) high frequency antenna that generates NVIS (sky-wave) signals that provide terrain independent radio communications using NVIS signals over corps/theater size areas. Aircraft flying low-level reconnaissance and attack missions passed their information to this facility for further relay via radio, telephone, teletype or messenger to command and control facilities similar to modern U.S. Army Tactical Operations Centers. Communications were self contained and operable both fixed and on-the-move.

Wallace and the whole Coalition Force in Iraq were magnificently executing classic offensive "Blitzkrieg" operations. In German, Blitzkrieg means lightning war. In the modern tactical sense it includes attacks where the enemy thinks you cannot attack, rapid advances into the heart of enemy forces and territory, and coordinated massive air and artillery attacks that with today's technology also includes missiles, attack helicopters and precision guided weapons. The use of such tactics is intended to stun the enemy and shock them to the point that they can no longer react. The German Army in World War II won most of their great victories with this tactic. Field Marshall's Hans von Seekt, Irwin Rommel and Heinz Guderian (a signal branch officer), are all given credit for inventing and perfecting the Blitzkrieg tactic with military scholars giving the lions share of the credit to Guderian the signalman. Guderian was not only

Germany's premier tactician, he eventually became Chief of Staff of the army imagine that happening to a U.S. Signal officer!

Why Guderian from the signal branch? Because, not only was old Heinz a tactical genius who conceived a new combined arms organization to execute the Blitzkrieg concept (the Panzer Division/Corps/Army) but also in his own words circa 1920: "I realized that I would no longer command from the rear with a telephone (*World War I style*) but from the front with a radio". Because of Guderian's signal background and position in the high command, he assured that each tank, aircraft, and unit command post in the Panzer force had long-range, mobile, combat-net radio communications of the right type to support its mission. (See Figs. 1 and 2). The same type radio Wallace needed almost 70 years later.

These were in large part the FuG-10 HF operating in the HF 2-18 MHz frequency range. The Guderian designed HF radio nets provided a level of command and control never before achieved on the battlefield. Long-range (HF) Combat-Net Radio made the Panzer Division and its air support the most destructive and efficient combined arms force in history. The U.S. Army learned much from the Germans of the 1930s and 1940s and thanks to officers such as Fox Connor, Ben Lear, George Marshall, Dwight Eisenhower and the always revered George Patton, the U.S. Army could also combine command and control, logistics, firepower and air support and by 1944 could out Blitzkrieg the inventors of the whole idea. We continue to improve this capability to this day as our victories in Iraq prove.

The basic concept of the German combined arms Panzer force refined by the American Army over the last 70 years and given modern technology was the force that Wallace entered Iraq with in 2003. In terms of organization and tactics. Rommel and Guderian would have felt quite at home in V Corps with their rapid movements, ability to see the battlefield, and elaborate methods of command, control and communications between ground and air elements. What would have shocked them all but particularly Guderian with his emphasis on communications, would have been the combat communications failure at the key defended highway bridge that Wallace described, and V Corps' apparent inability to provide timely command, control and intelligence information to its forward elements with the resources it already had. The problem of reaching the battalion Wallace refers to as being unreachable and therefore conducting a movement to contact not a deliberate attack because "all the command posts were moving" is a problem that was solved well before to 1939 in both the German and U.S. armies.

Fig. 2 Stryker-like Sd.Kfz-232 heavy armored wheeled command-post vehicle circa 1938. Note use of both the NVIS "frame" (horizontal loop) antenna for long-distance wide area on-the-move communications reflected off the ionosphere and a long efficient vertical monopole antenna for shorter distance "ground wave/surface wave" LOS communications. Facility communications were self-contained and capable of on OTM operation. NVIS was the primary mode of OTM omni-directional communications. A short vertical (whip) antenna was also provided for short distance OTM LOS communications.

Not only was it solved, it was solved without the use of satellite communications, complex tactical data networks, unmanned aerial vehicles, balloons, retransmission stations etc. A simple single-channel HF radio with the proper antenna, frequency assignment and the knowledge to use it is all that was required both then and now.

By the time the Germans invaded Poland (1939) Guderian had long worked out the techniques of Near Vertical Incidence Sky-wave HF radio communications and how to use FuG-10 HF radios, both monopole and loop antennas, surface wave radio propagation and the reflective properties of the ionosphere (NVIS) to communicate over huge areas when halted, on-the-move, or in the air. (See Fig. 3). Near Vertical Incidence Sky-wave techniques are described in U.S. Army Signal Corps publications as far back as the 1930s and are still currently reflected in our doctrine (*FM24-18, FM11-53, FM11-64, FM11-65, TM11-666, MIL-HDBK-413,* to name a few). Moreover, ground and airborne HF radio both fixed and on-the-move using NVIS techniques has been a topic of discussion by several authors in the *Army Communicator* more than a dozen times since 1983 alone.

Additionally, Special Opera-

tions Forces, Army Aviation and the Army Medical Department have deployed hundreds of new AN/ARC-220 and AN/PRC-138/150 HF radios for exactly this purpose over the last 15 years. C3 elements of the "big" Army also possess large numbers of HF radio's that range from the most modern (AN/PRC-150 family) to somewhat obsolete but still useable (AN/PRC-104 family) but as this instance proves, have not employed them nearly as well. This forces us to raise the question "why were minimum essential doctrinally required HF communications not available to V Corps Headquarters when they needed them in 2003 like they were for Rommel and Guderian in 1939 and for Patton and Eisenhower in the great Louisiana Maneuvers of 1940?"

Further, it also forces us to ask the question why is the U.S. Army with certain notable exceptions (SOF, AMEDD, Army Aviation) the only army in the world and the only department in the U.S. Department of Defense with the mindset to reject a proven viable, inexpensive, means of LOS and BLOS fixed and OTM military communications?

A large part of the answer is that HF communications is the victim of numerous "communications failure myths" created over the years by Signal officers desperately searching for reasons for failure to tell their commanders because they failed to be taught or to learn enough radio technology to effectively use the proven military potential of the HF medium and the equipment they were given. In short, you have to know something about HF to use it. This bad reputation was made even worse in the 1970s when it was coupled with the need to find "bill payers" for other programs such as satellite communications so HF resources were cut for both procurement and training. Additionally, during the same timeframe, Signal Corps leadership was bent on washing its hands of all combat net radio systems by declaring them "user-owned and operated". One can only wonder at the politics behind this decision. Let's begin to analyze Wallace's problem by debunking some of the worst common myths about HF tactical communications:

Myth 1 – The HF spectrum (2-30Mhz) by international treaty is limited to analog voice single sideband AM modulation in 3Khz channels and therefore can only support digital voice and data at rates no faster than 2400 bps.

-**False;** slow speed digital voice modes are in most modern HF radios for operation over degraded channels but so are MODEMS that can operate at speeds up to 9.6Kbs inside the mandated 3Khz channels. This allows voice, and digital applications such as e-mail, and imagery to be viable HF modes of operation.

Myth 2 – HF radios are not good for short distance tactical communications beyond-line-of-sight and leave gaps in area coverage.

- **False**, while intercontinental communications distances are commonly achieved using some HF techniques, use of properly selected antennas and frequencies will produce antenna patterns good for communications over Corps and below size areas independent of the intervening terrain and without gaps in coverage. ONLY HF RADIO CAN DO THIS WITHOUT THE NEED FOR SATCOM OR UAV SUPPORT! See fig 3.

Myth 3 – HF radio systems are not omni-directional and are therefore not suited for tactical communications.

- **False**, common HF antennas like vertical monopoles (whips), horizontal wire dipoles, and loop antennas all provide omni-directional communications when configured properly for that purpose. Even a horizontal wire dipole when located close to the earth is an omni-directional antenna (see Fig 3). These antennas can be made directional but only when elevated to a considerable height.

Myth 4 – HF radio systems are more adversely affected by ionospheric storms, solar flares, sudden Ionospheric disturbances and polar blackouts.

- **False to a large degree.** These naturally occurring phenomena to some degree affect all radio systems. The lower portion of the HF band will be affected first. Affects range from almost nothing to complete blackout. Most modern HF systems employed by the Army have a feature called Automatic Link Establishment. This feature scans the radio's assigned frequency band and will automatically establish communications on any authorized workable frequency quickly after a disturbance subsides. Tactical radios operating in other bands and equally affected by these factors don't have these features and may take longer to recover.

Myth 5 – "Sunspots" kill HF radio systems.

- **False to a large degree**. Sunspots are whirling masses of electrically charged gas formed by magnetic fields deep within the Sun. Magnetic fields often more powerful than the magnetic field of the Earth occur at the center of a sunspot. Huge waves of energy produced by the Sun's core erupt through the surface launching a mass of electrified gas and other material. Viewed from Earth this looks like a dark spot on the surface of the Sun where the eruption occurred. The electrified gas has a large magnetic field at its surface that races through space and can disrupt radio communications and electrical systems here on Earth. These disruptions can last a while and affect all radio communications. The lower frequencies such as HF take a while to recover from such disturbances. ALE again will find channels suitable for communications and restore service faster than systems using other tactical radio frequencies. Sunspots don't happen

that often but this complex sounding phenomenon has been used to explain signal outages to commanders far beyond what is justified.

Myth 6 – Levels of manmade, atmospheric, cosmic and internal electrical noise are greater in the HF frequency range and cannot be compensated for.

-False, The combination of ALE that selects the best authorized channel based on the best signal-to-noise ratio, higher transmitter power, and the system gain derived from the use of powerful voice and data digital signal processing techniques including Mixed Excitation Linear Predictive coding allow HF communications to proceed in an extremely degraded environment. Some techniques internal to modern army HF radios such as MELP will actually recover signals from near or below the noise level.

Myth 7 – BLOS HF communications OTM don't work.

-False, like everything else in radio system engineering success in OTM/BLOS HF communications depends on the critical selection of antennas and frequency. Vehicle mounted vertical monopole (whip) antennas work and will produce "surface-wave signals". Surface wave signals will propagate out to a certain distance along the earth and then due to their contact with the earth become to weak for use in tactical communications. Depending upon the type of ground or water under the signals, signals at HF frequencies can go relatively short distances to the horizon or in the case of seawater and certain ground conditions tend to bend along the surface of the earth and travel well beyond line of sight. Signals designed to take advantage of ionospheric reflection by using mobile antennas that produce high angle energy (loops and bent over whips) will commonly cover Army Corps/Theater size areas of operations without gaps in coverage. Only signals in the HF frequency band can be used since the ionosphere will not reflect signals at higher frequencies. While the U.S. Army has yet to deploy a loop antenna we do have plenty of various length whip antennas and adaptor fittings that should make OTM, BLOS tactical communications commonplace in the Army.

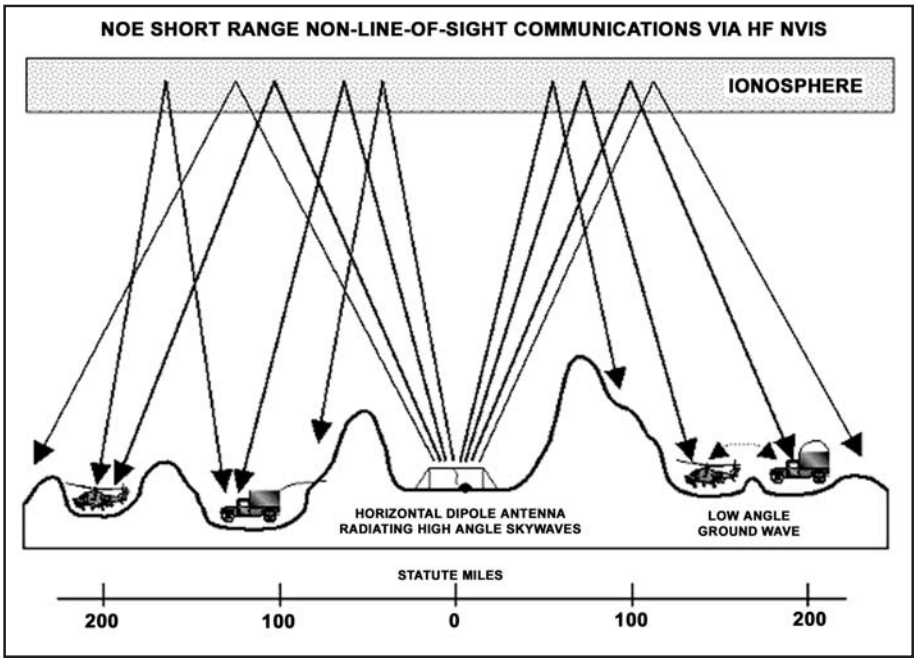


Fig. 3
Concept of Near Vertical Incidence Sky-wave signal propagation. Horizontal wire dipoles, bent (forward or rear) monopoles (whips), and aircraft or vehicle mounted loop antennas will all produce the high angle HF radiation that was needed to solve GEN William "Scott" Wallace's problem. Operation can be fixed or OTM and since the entire signal is showered down from above via ionospheric reflection terrain is NOT a factor. Frequency selection is a critical factor since higher frequencies will penetrate the ionosphere and go off into deep space. Automatic Link Establishment features in modern radios will find the best authorized frequency to establish NVIS communications. Frequencies are normally 2-4Mhz at night and 4-8Mhz daytime for corps/theater areas of coverage.

Myth 8 – HF doctrine does not exist in the U.S. Army.

-False again. Despite Soviet Admiral Sergei I. Gorshkov's often quoted dictum that it is "fruitless to study U.S. doctrine because they don't study it and if they did would feel no obligation to follow it". In this case doctrine is there and valid. There is a huge list of field manuals, technical manuals, military handbooks and training aids that detail solid doctrinal concepts in HF communications that are available. On top of that there is an equally huge pile of similar doctrine in DoD and other service publications. Some of this information dates back well into the early 1920s. Lack of doctrine cannot be an excuse for S/G-6s not to employ tactical HF communications.

Over the past three-plus decades (roughly the time the Signal Center and School moved from Fort Monmouth to Fort Gordon), belief in these myths has been handed down from generation to generation of Signal Officers until "HF is no damn good" has become a mantra recited by the uninformed in order to conceal their lack on knowledge and education. This is the root cause of why Wallace was not able to emulate the performance of Guderian, Rommel and the Panzer's of the 1930s not the lack of doctrine or

equipment.

Sadly, the Army has deployed across the force many of the elements that were needed to solve the communications OTM problem that Wallace so eloquently presented to both the Signal Symposium and in his testimony to Congress. More sadly still much of what was required was present and under Wallace's own command at the time he needed it so desperately. Specifically elements present that should have solved the problem were:

1 – Skimpy but adequate quantities of HF radios to provide OTM/BLOS HF communications over corps/theater size areas from corps to battalion level if anyone cared to locate them. This equipment is on the unit Table of Organization and Equipment.

2 - Doctrine that laid out the correct net radio structure to provide multiple HF communications paths from where the bridge information existed to where it was needed if anyone cared to read it.

3 – Procedures required to get the correct antennas configured and the radio equipment on the air in the OTM/BLOS mode - if anyone cared to implement them.

What was not present and caused the critical breakdown in communications was:

1 – Education- The Army no longer conducts an military occupational specialty producing course called Radio and Microwave System Officer (O505) as it did in the 60s and 70s. This hurts in an Army that uses combat net radios for almost everything on the battlefield. The idea of calling CNR "user-owned and operated" is bankrupt. Radio communications is not a trivial subject and to learn it to a level required for effective use in combat Signal officers, warrant officers and senior NCOs need to be better educated - particularly in the basic fields of radio physics/systems engineering, antennas, radio-wave propagation and frequency engineering. These subjects cannot be given the rush treatment during initial training as we do today. Each requires hard time in the classroom. This doesn't mean everyone in Signal needs to have a bachelor of science in electrical engineering but it does mean far more instruction than we give now and at a far higher level - particularly for OTM and BLOS communications such as HF and SATCOM. Signal personnel educated this way would have in this situation been able to analyze the tactical situation and had the right CNR (HF) and the right antenna, and the right frequency assignment ready to go as the situation developed. If it is beyond the Army's current capability to educate to this level then we should consider contracting a local community college or technical school to deliver the proper instruction. This needs to be backed up with a takeaway package of technical publications and computer-based training that is retained by each graduate for use in the field. This is not new and is currently implemented by other services.

2 – Training – For far too long the Signal Corps idea of training has been teaching students what button to push, or what module/box to change. What we have failed to teach is the "why". In many cases Signal personnel cannot explain why they are doing what they are doing - they are just doing it by rote when it comes to CNR systems. A logical thinking process and a reasonable knowledge of how things work is just not being imparted to many (not all) of our signal soldiers. When these personnel get to field (S-6) assignments they are expected to be the commanders technical experts with all communications/automation equipment whether it is owned by the user or not. Often they fail with CNRs through no fault of their own because they have not seen this "user" radio equipment before. When as so often happens in deployed situations something unusual happens, the button - pushers and the module changers are stymied because they have no training in a logical method that will isolate CNR system problems and fix them based on knowing the equipment and how it works. Additionally, personnel trained this way are not prepared to jump into situations like the one that faced Wallace with innovative technical applications to fit unique tactical situations on the fly. For many years, I have heard numerous senior Signal officers say essentially "you really never learn this stuff until you get to a unit and you're on the job". The incident at the Iraqi bridge proves that our branch "OJT" concept is as bankrupt as the "user-owned-and-operated" concept. Hoping for the best is just not a course of action that works. Hard time in the classroom backed up by field training is the only thing that does prepare a Signal soldier for combat operations.

The situation that Wallace talks about is not new. In fact it is roughly equivalent to the famous Operation Market Garden of World War-II depicted in the film *A Bridge Too Far.* In both operations higher headquarters knew the tactical situation confronting the forward force well because of air reconnaissance and similar high command resources. What failed in both cases was the supporting signal organizations ability to use on-hand, existing, CNR systems to establish radio communications between forward and supporting forces that were BLOS but really not that far away. In 1944 GEN Omar Bradley stated to his subordinate commanders after the Market Garden force had been extricated "It took an act of Congress to make you officers and gentleman it takes communications to make you a commander." Truer words were never spoken.

We failed Wallace in this instance. He knows it. It was a small but significant action in a big operation but he is focused on it. The force and the Signal staff recovered from the shortfall in combat communications and moved on to take the bridge eventually but with some difficulty. The force and the Signal

staff continued the fight until we won the war. The failure was however indicative (at least to Wallace) that something was very wrong with combat communications and the Signal Corps. Wallace would not have brought this up before the Congress of the United States and again at the 2003 Signal Symposium if he were not highly concerned.

What we need to do is listen to what the general is saying and fix it with the resources we have on hand today. This includes:

1) getting more HF hardware and putting it where it needs to be,

2) building a working systems architecture for all Army organizations,

3) building unit TOEs that track the systems architecture,

4) having operations and organizational concepts that track the SA and the TOE, and

5) by dispelling the myths about HF radio systems shown above through a well thought out professional CNR education and training program,

6) by replacing in the Signal Corps the bankrupt concepts of "user owned and operated" and "on the job professional signal training" with level appropriate knowledge and experience and by providing CNR sustainment training on a regular basis to signal staffs in their field locations.

We need to remember in this age when the "technology junkies" seem to rule our thinking with their exotic networking and information transfer ideas that the simple CNR is as basic to the Signal Corps as the rifle is to the infantry. Often in Blitzkrieg operations like OIF the network centric way of fighting is out the window (Wallace talks about this in his presentation also) and the simple HF-CNR is the only system that can get the minimum essential traffic through -even if the force is moving and spread BLOS. The HF radio has the characteristics that can hold highly mobile operations together over any kind of battlefield until more elaborate higher volume systems can be deployed. The famous Signal dictum of PACE (primary, alternate, contingency, emergency) is a very valid concept that includes HF and all CNRs (VHF/UHF etc.).

What we need to do is listen to what the general is saying and fix it with the resources we have on hand today.

In order to be responsive to changing battlefield situations and maintain our credibility with the commanders, signal personnel need to understand all systems (including the humble single channel HF radio) and be able to fit the tool to the job. On the battlefield you never know what system will have to carry the ball for a commander who needs to communicate.

Mr. Fiedler – a retired Signal Corps lieutenant colonel – is an engineer and project director at the project manager for tactical-radio communications systems, Fort Monmouth. Past assignments include service with Army avionics, electronic warfare, combat-surveillance and target-acquisition laboratories, Army Communications Systems Agency, PM for mobile-subscriber equipment, PM-SINCGARS and PM for All-Source Analysis System. He's also served as assistant PM, field-office chief and director of integration for the Joint Tactical Fusion Program, a field-operating agency of the deputy chief of staff for operations. Fiedler has served in Army, Army Reserve and Army National Guard Signal, infantry and armor units and as a DA civilian engineer since 1971. He holds degrees in both physics and engineering and a master's degree in industrial management. He is the author of many articles in the fields of combat communications and electronic warfare.

Acronym QuickScan

ALE – Automatic Link Establishment
AMEDD – Army Medical Department
AVN – Army Aviation
BCOTM – Battle-Command-on-the-move
BLOS – beyond-line-of-sight
C2 – command and control
C3 – command, control and communications
CNR – combat net radios
CP – command post
DoD – Department of Defense
DSP – digital signal processing
HF – high frequency
LOS – line-of sight
MELP – Mixed Excitation Linear Predictive
MOS – military occupational specialty
NVIS – Near Vertical Incidence Skywave
O&O – operations and organizational
OJT – on-the-job-training
OTM – on-the-move
PACE – primary, alternate, contingency, emergency
SA – systems architecture
SATCOM – satellite communications
SIDs – sudden Ionospheric disturbances
SOF – Special Operations Forces Forces
TOC – Tactical Operations Centers
TOE – Table of Organization and Equipment
UAVs – unmanned aerial vehicles

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Joint Network Management System

(AN/USQ-176 (V) 1, 2 and 3)

The JNMS is Acquisition Category level III Joint program that provides an automated network planning and management capability to joint tactical communications network planners/managers at Combatant Commands, Combatant Command Service components, Joint Task Forces, and JTF Service components. It integrates the capabilities of Commercial Off-The-Shelf, Government Off-The-Shelf and some developmental software to meet network planning and management deficiencies identified by the Combatant Commands. It will replace the interim system, the Joint Defense Information Infrastructure Control System – Deployed, now fielded to the warfighting Combatant Commanders. It provides the means for timely decisions and synchronization of communication assets to support mission requirements, adds flexibility to better support the commander's intent, improves situational awareness by providing a common view of the network and provides a capability to better utilize scarce resources to optimize the capacity of the network and support the fight.

There are three versions of the JNMS being developed. The versions are distinguished by the level of functionality provided. Versions 1 and 3 have a monitoring and security capability. Version 2 has the full JNMS capability which includes planning, monitoring and reconfiguration, fault management and security and is accredited for use on secret networks. Version 1 has a National Security Agency approved one-way fiber modem that can be used with unclassified networks to forward status information to a version 2 system. This provides a capability to display both unclassified and secret network situational awareness information on one system. Version 3 was specifically developed for use on Top Secret networks. Its possible usage for coalition networks is currently being investigated.

JNMS is in the final stages of the System Development and Demonstration phase of the acquisition life cycle having successfully completed its Functional Qualification Testing in December 2003. It is now undergoing its Operational Testing at three sites – Fort Monmouth, N.J.; Norfolk, Va.; and Tampa, Fla. The sponsoring combatant command is U.S. Joint Forces Command. The test consists of personnel from the Army, Air Force, Marine and Joint Communications Support Element and Navy augmentation at the JFCOM Global C4 Communications Center.

JNMS is scheduled for a formal Milestone C decision in April 2004 with the Milestone Decision Authority, Program Executive Office for Command, Control, and Communications Tactical. This decision will authorize entry into the Production and Deployment phase of the acquisition life cycle and also allow the Services to support

fielding in 4QFY04. A Full Rate Production decision and formal Materiel Release would be sought after the final Operational Test Report is published and before the start of fielding. Fielding is scheduled to begin in September 2004 for approved U.S. Central Command and U.S. Special Operations Command units. Army units down to and including Corps Signal Brigades are scheduled to receive the JNMS, with the 35th Signal Brigade schedule to be the Army's first JNMS fielded unit.

The Product Manager for Communication Management Systems is now conducting New Equipment Introductory Briefings for units scheduled to receive the JNMS. The NMIBs provide the gaining commands with operational, training and support information as well as laying out responsibilities for the gaining command during their fielding.

The Army requested that the Inter-Service Training Review Organization conduct a study to determine the feasibility of conducting JNMS resident training for all Services at one location. The first phase of the study was completed in October 2003. The final phase is scheduled to be conducted in May 2004. The Army has recommended establishing the course at the U.S. Army Signal Center, Fort Gordon, Ga.

For further information on JNMS, contact CPT Quentin Smith or Billy Rogers, TSM WIN-T, (706) 791-2721/2334 or DSN 780-2721/2334. Email addresses are smithql@gordon.army.mil or rogersb@gordon.army.mil.

Acronym QuickScan

ACAT – JNMS is Acquisition Category
CENTCOM – U. S. Central Command
COTS – Commercial Off-The-Shelf
FRP – Full Rate Production
FQT – Functional Qualification Testing
GCCC – Global C4 Communications Center.
GOTS – Government Off-The-Shelf
ITRO – Inter-Service Training Review Organization
JCSE – Joint Communications Support Element
JDIICS – Joint Defense Information Infrastructure Control System – Deployed
JTF – Joint Task Forces
JNMS – Joint Network Management System
MDA – Milestone Decision Authority
NMIBs – New Equipment Introductory Briefings
NSA – National Security Agency
OT – Operational Testing
PEO C3T – Program Executive Office for Command, Control and Communications Tactical
PdM CMS – Product Manager for Communication Management Systems
SOCOM – Special Operations Command
USJFCOM – U.S. Joint Forces Command

TSM-Tactical Radio

Joint Tactical Radio System:

On Feb. 26, 2004, the Joint Tactical Radio System Joint Program Office sponsored an Industry Day event. The purpose of which was to outline the JTRS JPO's goals for the software-defined radio initiative and to offer an opportunity for potential vendors to pose questions and communicate their concerns. The event successfully sparked an exchange of ideas and information to fully explore the role of industry within the program from a lifecycle perspective that will span decades of evolutionary JTRS development. The JTRS industry day briefing included presentations by the Office of the Secretary of Defense, the Army and the JTRS JPO. The meetings involved discussion on the JTRS program and its architecture and networking issues.

The Program Executive Office for Command, Control and Communications Tactical expects to award the JTRS Cluster 5 contract by 3rd Quarter Fiscal Year 2004. The Cluster 5 program, which will consist of man pack, hand held and small-embedded form factor variants, is expected to produce the first JTRS software-defined radios specifically designed with the soldier as a system concept in mind. ITT Industries, Fort Wayne, Ind., and General Dynamics Inc., Falls Church, Va., submitted proposals for the JTRS Cluster 5 contract. ITT's team includes Harris Corp., Melbourne, Fla., and Boeing Co., Chicago, Ill. General Dynamics team members are BAE Systems, Fort Wayne, Ind.; Rockwell Collins, Cedar Rapids, Iowa; and Thales Group, Alexandria, Va.

Enhanced Position Location Reporting System:

The Enhanced Position Location Reporting System fielding preparation continues. New Equipment Training Contractors completed training of EPLRS Network Manager operators and system planners for 3-265th Florida National Guard in December 2003. The training was conducted at the U.S. Army Signal Center and Fort Gordon, Ga., and on-site for the general-purpose users. Initial fielding of assets to support the 172nd Signal Company began during early January 2004. Refresher training for the Military Occupational Specialty 31C ENM operators was also completed in January. NET Contractors are on-site continuing to train the operation of the EPLRS radio set. A newly improved version of the EPLRS Network Control Station was fielded to the Florida National Guard and the 3rd Stryker Brigade Combat Team in Alaska. Retrofit of existing EPLRS-equipped units such as the 4th Infantry Division, 1st Cavalry, SBCT-1, SBCT-2, and the 3rd ID will be completed during the next two calendar years. The retrofit and training of the 4th ID is tentatively scheduled for July/August. EPLRS is one of the key data communications backbones which supports the Army's tactical Internet and Air Defense Artillery sensors as well as

unit weapons systems. The ENM provides greater network management capability and operator flexibility compared to the current EPLRS NCS.

EPLRS testing continued during the 2nd Quarter FY 04 at Fort Huachuca. Software tests will verify the latest upgrades to the EPLRS Radio Set. The U.S. Navy Space and Naval Warfare Systems Command was awarded the production contract in December, which will result in the building of all remaining Net Control Stations. *(These are also referred to as the ENM).* Plans for fielding to SBCT-4 are also ongoing to support Cohesive Operational Readiness Training and fielding later this year.

Acronym QuickScan

ADA – Air Defense Artillery
COHORT – Cohesive Operational Readiness Training
ENM – EPLRS Network Manager
EPLRS – Enhanced Position Location Reporting System
FY – fiscal year
GPU – general-purpose users
ID – Infantry Division
JPO – Joint Program Office
JTRS – Joint Tactical Radio System
NET – New Equipment Training
NCS – Net Control Station
PEO C3T – Program Executive Office for Command, Control and Communications Tactical
SPAWAR – Space and Naval Warfare Systems Command
SBCT – 3rd Stryker Brigade Combat Team

TSM-SATCOM

Ka-STARS

by Debbie Linton

The Ka-Band Satellite Transmit And Receive System will provide a wideband communication capability to meet essential user operational requirements, leveraging the Wideband Gapfiller program. KaSTARS is being introduced to alleviate the spectrum saturation of X-band. KaSTARS will greatly increase both available single user data rate and total satellite capacity over today's DSCS Ill satellites and subsequent WGS satellites while focusing support to the warfighting forces.

KaSTARS is engineered and configured to satisfy validated Global Command and Control System requirements by providing high-availability communications for the National Command Authorities, the Joint Chiefs of Staff and the unified and specified commanders. The KaSTARS also provides connectivity from early warning, sensor sites, and intelligence agencies to command centers and information processing centers. The primary operational objective of the KaSTARS is to provide continuous high quality communications for each validated user.

The KaSTARS, AN/GSC-XX system, design shall comply with the JTA-Army and is in use in communications throughout the WGS Ka-Band and other military satellites. It is fabricated in a fixed configuration, but capable of being relocated. The item is controlled, and its status and performance is monitored continuously by a Control, Monitor and Alarm subsystem, which provides for local or remote operation and

Current Location	Terminals	Date Fielded
CECOM, Fort Monmouth, N.J.	2	1998
Signal Center, Fort Gordon, GA	6	1999
124th Signal Bn, Fort Hood, TX	12	1999
USAREUR HQ, Mannheim, GE	1	2000
3rd Corps, Fort Hood, TX	15	2001
SBCT-1, Fort Lewis, WA	3	2001
SBCT-2, Fort Lewis, WA	3	2002
13th Signal Bn, Fort Hood, TX	12	2002
141st Signal Bn, 1AD, Germany	10	2003
440th Signal Bn, Germany	5	2003
121st Signal Bn, Germany	10	2003
SBCT-3, Fort Wainwright, AK	3	2004

Projected Location	Terminals	Date Due For Fielding
(3ID) 123rd Signal Bn, Fort Stewart, GA	12	2004
(101st)501st Signal Bn, Fort Campbell, KY	12	2005
447th Signal Bn, Fort Gordon, GA	6	2005
(1ID) 331st Signal Co. Fort Riley, KS	2	2005
(1AD) 596th Signal Co. Fort Riley, KS	2	2005
SBCT-4, Fort Polk, LA	3	2005
2nd Infantry Division, Korea	10	2005
SBCT-6, 28th ID, Pennsylvania NG	5	2006

integration with Defense Satellite Communications System network control facilities.

Projected locations for six KaSTARS terminals are: Camp Roberts, Calif.; Landstuhl, Germany (2); Lago Patria, Italy; Northwest, Va.; and Wahiawa, Hawaii. Fielding will be begin in 2006.

Point of contact for additional information on the KaSTARS program is Frank Stein, DSN 780-7903, Commercial (706) 791-7903, email: steinf@gordon.army.mil.

AN/TSC-154/SMART-T Fielding Plan

The Secure Mobile Anti-jam Reliable Tactical Terminal, AN/TSC-154 is a transportable, tactical satellite communications terminal that operates with the Milstar satellite low data rate and medium data rate communications payloads. SMART-T provides multichannel range extension for MSE at echelons corps and below. Fielding of the terminals is underway. Projected procurement is 209 terminals through 2008.

Point of contact for additional information on SMART-T fielding is Steve Churm, DSN 780-3418, COMM (706) 791-3418, email: churms@gordon.army.mil.

Milstar Milestone

The first Milstar 1 communications satellite has achieved its 10-year design life of on-orbit service providing secure, reliable communications to warfighters engaged in a variety of global military operations. Launched aboard a Titan 4 launch vehicle from Cape Canaveral, Fla., on Feb. 7, 1994, the first Milstar satellite is one of two Block I spacecraft on orbit equipped with a UHF and Low Data Rate EHF payload. It is also equipped with crosslink payloads to communicate with other on orbit satellites. In 2001, transition to a Block II satellite configuration was accomplished with the successful launch of the first Milstar 2 satellite.

The Milstar Block II system offers a variety of enhanced communications features for the U.S. military, including the Medium Data Rate EHF payload which can process data at speeds up to 1.5 megabits per second.

Milstar is the Defense Department's most technologically advanced communications satellite system, which provides critical, secure links to national leadership and U.S. forces around the world. The Milstar system is the only survivable, endurable means that the President, the Secretary of Defense and the Commander, U.S. Strategic Command have to maintain positive command and control of U.S. strategic forces. April 8, 2003, the final Milstar 2 satellite was successfully launched thereby completing the first space-based global network capable of transmitting voice, data, imagery and video.

Point of contact for additional information on the Milstar system is Steve Churm, DSN 780-3418, Commercial (706) 798-6711, email: stephen.b.churm@us.army.mil.

Ms. Linton is with the TRADOC Systems Management – Tactical Satellite, Fort Gordon, Ga.

Acronym QuickScan

CMA — Control, Monitor and Alarm
DSCS — Defense Satellite Communications System
GCCS - Global Command and Control System
JCS - Joint Chiefs of Staff
Ka STARS - Ka-Band Satellite Transmit And Receive System
LDR — low data rate
MDR — medium data rate
NCA - National Command Authorities
SMART-T — Secure Mobile Anti-jam Reliable Tactical Terminal
WGS - Wideband Gapfiller

Circuit check

News and trends of interest to the Signal Regiment

NEWS

LandWarNet equips Soldiers with battlefield information

by SPC Lorie Jewell

WASHINGTON – Just as Soldiers need the best equipment and training to be successful on the battlefield, a steady diet of information is just as vital, Army leaders believe.

"Information is power," said BG Jan Hicks, Chief of Signal and commanding general of the U.S. Army Signal Corps and Fort Gordon, Ga. "We want to know things about the battlefield and we want to know things about our enemy on the battlefield. At the same time, we don't want the enemy to know what we know, or to know things about us."

Connecting Soldiers to information they need, whenever they need it and wherever they are, is the job of the Network, recently renamed LandWarNet. It's one of 17 focus areas the Army is emphasizing to win the Global War on Terrorism.

Hicks heads the task force assigned to make recommendations on how best to develop and improve LandWarNet so that it delivers better battle command capabilities to current, future and joint forces.

The joint aspect is of particular interest, Hicks said.

"We're not going to war as an Army. We're going to war with our Sailor and Airmen friends," Hicks said. "We must be able to communicate with them without an extra step. We need a system that allows one call."

Ultimately, the task force wants to see a LandWarNet that gives combatant commanders the same capabilities for accessing information in any location, whether that's at a desktop computer in their office, in an aircraft, on a vessel at sea, in a vehicle en route to battle or in a post-battle camp, Hicks said.

BG Janet A. Hicks talks with Information Assurance Symposium workshop attendees. Hicks heads the task force assigned to make recommendations on how best to develop and improve LandWarNet.

"We're working on different ways to get there," she added.

One of those ways is through the Global Information Grid, or GIG. Hicks describes it as scaffolding built up around the globe.

"Communication lines go all over, pulsing through the GIG," she said. "It services the defense information switch network, or DISN, which is provided by the Defense Information Services Agency."

Forces can reach into the DISN with satellites and pull information services down to wherever they are in the world, she explained.

A combination of military and commercial technology powers LandWarNet, with leaders committed to pursuing programs that will enhance it even more.

"Our current IT investment strategy is centered on leveraging the best available commercial technology," said COL James Costigan, director of Combat Development at the U.S. Army Signal Center.

Leaders acknowledge that getting the network to the level the task force envisions is an expensive endeavor. Just how much is still being determined.

"We're talking about an almost clean sweep of the kind of equipment we have now," Hicks said. "It will take a great deal of money to retool our networks while at war."

Many leaders believe the Army can't afford not to make LandWarNet all it can be, however.

"The application of information technology can enhance the efficiency and effectiveness of the processes involved in war fighting," said Costigan. "Our experimentation with objective force concepts and our real-world experience in OIF shows us this notion is valid. Investing in IT systems to enable war fighting is therefore logical and necessary."

SPC Jewell is with the Army News Service.

JFCOM empowers warfighters by setting up standing joint force headquarters

U.S. Joint Forces Command has delivered the standing joint force

headquarters core element to two regional combatant commanders during the last five months and will deliver three more by October.

by SGT Jon Cupp

SUFFOLK, VA. — U.S Joint Forces Command recently assisted in the delivery of additional joint warfighting capability to two of the Defense Department's regional combatant commands when the command charged with leading the transformation of the U.S. military helped stand up a vital new function.

USJFCOM delivered the Standing Joint Force Headquarters Core Element, a 58-member team of operational planners and information command and control specialists which forms the core of a joint task force headquarters command structure.

Within the past five months, USJFCOM helped bring on line two SJFHQs for regional combatant commanders at U.S. Pacific Command and at U.S. Southern Command. According to SJFHQ planners, USJFCOM also plans to stand up SJFHQs at three other unified commands, including the U.S. European Command and U.S. Northern Command who are scheduled to be on line by October 2004.

All geographic combatant commands are slated to have SJFHQs by fiscal year 2005, according to Navy Rear ADM Richard J. O'Hanlon, who oversees the SJFHQ development and implementation efforts. The capability is a high priority of Chairman of the Joint Chiefs of Staff Air Force GEN Richard Myers due to its importance to the warfighter.

"(The SJFHQ) provides a ready full-time team that aids in the ability to stand up a joint task force headquarters quickly," said O'Hanlon. "By providing a joint cadre of trained planners and operators who have a thorough understanding of effects based operations and the regional commander's intent, we have found that a joint task force headquarters can come up to fighting speed quicker than we have seen in the past.

"Using tools such as the collaborative information environment, a JTF headquarters using the enabling capabilities of the SJFHQ can get all the relevant planning and operating information on the table much faster thus decreasing its planning and recommendation cycle so commanders can make decisions faster than we've seen in the past," said the admiral.

"What would have normally taken (the RCC) days to weeks, in planning effort, now takes hours to less than a couple of days," said Navy CPT Tom McKeon, deputy director of USJFCOM's SJFHQ prototype.

According to McKeon, the process' speed increases since all or part of an SJFHQ element work for a combatant commander.

Through the use of collaborative tools such as the CIE, the SJFHQ develops a pre-crisis knowledge base of an adversary's systems and capabilities which leads to the creation of an operational network assessment.

"The ONA gives the warfighter a great analysis of the area they're operating in so they know what the key nodes are that they need to influence to reach their objectives and get the results they're looking for in their theater," said O'Hanlon.

The SJFHQ also incorporates effects based planning, which designs strategies to attack key strengths and weaknesses of an enemy. Within this process, an SJFHQ enables RCCs to coordinate with members of the interagency community, such as the U.S. State Department or Department of Justice, to assist in crisis interaction in the planning of a campaign.

The ONA supports the SJFHQ in performing effects based operations, which deal with the diplomatic, information, military, economic and social aspects of a campaign and are designed to alter an adversary's behavior and ability to continue effective operations.

An additional six-member system of systems analysis team helps build the SJFHQ's situational awareness in the theater of operations, said McKeon.

"You actually have a core group of 58 people, supported by the 6 SoSA, who are cross-functionally organized with logisticians, operations specialists, planners and communicators that come from all the services," said McKeon, "They operate together within the RCC headquarters both in exercises and planning and can focus on an area of interest before it becomes a crisis area."

When combatant commanders need to stand up a joint task force, they will now have a well-informed cadre of individuals from the SJFHQ who have worked together, trained together, understand what is going on in the area of responsibility, have developed situational awareness and a situational understanding of the commander's intent, according to McKeon.

One of the major roles for USJFCOM in assisting the set up of SJFHQs involves an 11-month training process that includes not only classroom training, but also training via the CIE.

"We do some forming exercises where we take members of the SJFHQ and put them through some exercises that help teach them their jobs and duties, capped off by theater exercises where the SJFHQ gets to demonstrate it's ability to plan and execute an operation," said O'Hanlon.

"After the SJFHQ is formed we routinely contact them collaboratively to answer their questions or to provide continuing training or keep them informed on what we're learning as we continue to evolve some of the aspects of SJFHQ," he added.

Prior to the forming of SJFHQs, USJFCOM focused its efforts for nearly five years to figure out how to conduct operations in tandem with the standing up of a JTF HQ. In the past, problems arose when commanders at service-centric two or three star headquarters were tasked with standing up a JTF HQ due to

their service centric manning and unfamiliarity with the operational level situation, according to O'Hanlon.

By February 2002, USJFCOM had moved the SJFHQ from the conceptual stage to the experimental design phase. Another high mark for the SJFHQ came later that year during Millennium Challenge 02.

"SFHQs were one of the main focus areas examined during MC02, and it was proven there that they added real value," said O'Hanlon.

Recent exercises to include Terminal Fury 04 and Blue Advance 04 have also helped to prove the worth of SJFHQs through feedback from combatant commanders, according to O'Hanlon.

"PACOM leaders were impressed with the effects based mentality that their SJFHQ brought to the table and the effects assessment process that allowed them to see whether or not their plan was working," said O'Hanlon. "They were also impressed with the interagency coordination aspects."

"SOUTHCOM liked the planning processes in that the situational awareness of the rest of the headquarters staff was higher prior to the (Blue Advance) exercise," added O'Hanlon. "This was because of the SJFHQ not forcing, but facilitating people to think through the problem and being better able to begin."

The mission of the SJFHQ currently in operation at USJFCOM will not cease once all the combatant commands have their own SJFHQs formed.

"The one that's in existence right now is a training unit, and once the SJFHQs are stood up by FY05, we intend to keep this unit in existence to continue to train new crewmembers that are showing up at the RCC and to be able to provide assistance to the RCCs as necessary," said O'Hanlon.

Additionally, according to O'Hanlon, strategic planning guidance for 2006 gives direction for the establishment of another USJFCOM SJFHQ-one which functions as an operational unit.

"Once trained and ready, we will be able to deploy this SJFHQ worldwide to support RCCs with their focus areas," said O'Hanlon. "We'll have an operational mission and if an RCC asks for our SJFHQ, as force provider, we will supply that SJFHQ to support the RCC."

Participants in the project said establishing the SJFHQs has been a worthwhile experience.

"This is a tremendous opportunity to contribute to the joint world," said O'Hanlon. "We have attacked the traditional problems with the stand up of joint task force headquarters and have developed new tools to help (combatant commanders) analyze their tasks more thoroughly. My people are pretty excited about what they're doing and look forward to continue to meet the challenges ahead in bringing the SJFHQ to the field."

McKeon echoed O'Hanlon's sentiments.

"To be able to build this team that has the potential for averting a conflict before it can start and bring all the elements of national power to bear should the conflict go into crisis is wonderful," said McKeon. "You're talking about not only saving the lives of our service members but also the men, women and children of a country that may be facing a potential conflict."

SGT Cupp is with USJFCOM Public Affairs Office.

New super computer enhances state of the art for urban warfare experimentation

Engineers and developers are working on creating some powerful new capabilities at USJFCOM's Joint Experimentation Directorate. Increased power in modeling and simulation super computer hardware will mean joint warfighters will receive more realistic training as they prepare to tackle urban battlefields around the world.

by SGT Jon Cupp

SUFFOLK, VA. — One of USJFCOM's Joint Experimentation Directorate's (J9) new capabilities may help change the way warfighters experiment and train in the urban battlefields of the future. J9 developers and engineers are currently testing the Scale Parallel Processor, a multi-million dollar super computer, which the command will use to help combatant commanders experiment and train in urban operations by creating a realistic simulation of the environments in which they conduct future operations. J9 programmers, working with the powerful SPP can model an urban environment, to include representations called "entities" of items such as detailed city streets, buildings, vehicles, aircraft, ocean tides, weather, trees and civilian populations.

According to project engineers, the SPP allows simulations at a scale and level of resolution never before possible. "As we started doing entity-based experiments, we could not scale the experiments to the desired levels with the computer hardware that was available," said Rae Dehncke, from the Institute of Defense Analyses, who is supporting J9's modeling and simulation efforts. "We needed an SPP to increase the number of entities in a given scenario, and to allow higher resolution and higher fidelity in the entities and the synthetic environment.

The SPP increases our computer power so we could model a larger number of urban environments and populate them with thousands of vehicles and civilians we would expect to find in such urban areas. We just could not do that with the existing PC based computer system."During Millennium Challenge 02, programmers could simulate only about 35,000 entities, but utilizing the power of the SPP they can now create over one million, according to Tony Cerri, director of J9's experimentation, engineering support department. Cerri said the SPP enables JFCOM to better represent the real urban environment and that will help combatant commanders better understand some of the problems

that occur when fighting on urban terrain.

"We can simulate multi-elevation buildings down to details such as stairs, situations in which soldiers are waiting in ambush and we can represent the urban environment in much greater detail, giving combatant commanders the opportunity to experiment and train on the types of problems he faces in the complex urban battlespace."

"During Operation Iraqi Freedom, our simulations were limited and we could only simulate a couple of city blocks in great detail. Now we can play 'where's Sadaam' in a much more realistic setting," said Cerri. "We can simulate real cities tree by tree and building by building if necessary. Troops could deploy to any nation on earth and we're currently dealing with territory all over the world so that we can more quickly provide simulation support to the warfighters.

"Developers are constantly working to increase the capabilities of the simulations," said Cerri. The simulation federation now running on the SPP can also simulate structures and obstacles which can be found on urban warfighting landscapes such as underground tunnels, roadside explosives, concertina wire, sand bags and metal barriers called "dragon's teeth" to name a few. Cerri said upcoming challenges include accurately mirroring cultural aspects of the population such as going to work and home again at the right times of day.

The "clutter" of civilians moving about the urban environment on foot and in vehicles greatly adds to the realism of the simulation.

"We can also build things in a simulation that don't yet exist in order to test new concepts or new technology. The purpose of our experimentation is to simulate these concepts and new technologies and see if they work," added Cerri. Dr. Bob Lucas, from the Information Sciences Institute at the University of Southern California, said the power of the SPP J9 is currently using, a computer about the size of a large filing cabinet, can be compared to having the combined capabilities of 256 top-of-the-line, dual-processor personal computers linked together. During a recent J9 capabilities test, three SPPs, one in J9's Simulation Analysis Center in Suffolk, Va., one in Maui, Hawaii, and one at Wright Patterson Air Force Base in Ohio were linked together over the Defense Research Engineering Network to demonstrate the ability of the SPPs and the network to work together to support J9. J9 has been working in cooperation with ISI, the Institute of Defense Analyses and the High Performance Computer Center in Maui, Hawaii, to develop the capabilities of the SPP to potentially support other JFCOM programs such as the Joint National Training Capability.

"Our partnership with ISI allows us to take advantage of the experts in academia in these projects," said Dehncke. "There's no way we could have done this by ourselves and one of ADM (Edmund P.) Giambastiani's goals is to involve industry and academia to help us get these projects off the ground."

"The High Performance Computer Management Program recognized the joint warfighter is doing significant experimentation, so they gave us our own computer. JFCOM was their number one priority thanks to the work we had already done and the advancements we're making here," added Dehncke.

In the future, combatant commanders will be able to network into the SPP-simulated environments through the Distributed Continuous Experimentation Environment and one of the goals of the SPP Project is for the combatant commanders to have easy access to the computer's capabilities.

"From any installation within the United States, we want people to have the ability to link to our events," said Dehncke. "Our goal is to be able to turn on, plug in and use this anywhere across the country, so people won't have to travel continuously to participate in JFCOM events." Development of the prototype began over a year and a half ago, and by October 2002, the development teams were building, testing and growing the capabilities.

Several specialists working with the SPP Project recently attended the Interservice/Industry Training Simulation and Education Conference in Orlando, Fla., and presented papers on the subject. "From the JFCOM perspective, this is a great opportunity to advance the state of the art through modeling and simulation," said Dehncke. "Implementation of the SPP truly is a major step forward and our target of modeling a million entities represents a significant advancement.

"Dehncke said the project has created a lot of interest from people involved with joint experimentation.

"This is cutting-edge stuff and everyone is excited," said Dehncke. "All of the services and representatives from joint commands are eagerly awaiting our demonstration of the SPP operating within the DCEE."

An upcoming joint urban operations experiment will feature the SPP in the computer's first official use with JFCOM. J9 hopes to have the SPP fully implemented and available for use by regional combatant commanders in October 2004.

SGT Cupp is with USJFCOM Public AffairsOffice.

Friend or Foe repairs get aircraft flying again

by Anthony Ricchiazzi

Tobyhanna Army Depot, Pa. — Technicians quickly responded to an urgent request to repair critical Identification Friend or Foe systems in support of Operation Iraqi Freedom.

Tobyhanna received the request in January from the U.S. Army Missile Command to repair and test four TS-1843B/APX In–Flight Transponder Test Sets.

"The 1843 is installed in aircraft or ships as part of the IFF transponder systems; it's connected between

Bob Harvey, an electronics mechanic in Tobyhanna Army Depot's Avionics–Intelligence Electronics Warfare Systems Directorate, tests a TS-1843B/APX In–Flight Transponder Test Set. Tobyhanna technicians met an urgent request in January to repair and test four test sets to support Operation Iraqi Freedom.

the IFF antenna and the RT-859A/APX-72 Transponder," explained John Ross, Transponder Division chief, Avionics–Intelligence Electronics Warfare Systems Directorate. "It allows the crew to monitor the performance of the transponder when it is challenged by signals from external interrogators."

The test set can also interrogate the AN/APX-72, evaluating functions such as receiver sensitivity and tuned frequency, and reply frequency.

The AN/APX-72 provides automatic radar identification of friendly units and is used by all military branches. It receives interrogations, decodes them and transmits replies.

Due to back orders of the test sets caused by high usage rates, four aircraft were grounded. Division personnel expedited the repairs and shipped them within days of the request.

"We got the call on Jan. 21 and hand-carried the test sets to DDTP [Defense Distribution Depot Tobyhanna] for shipping on Jan. 23," Ross said.

The work involved mechanical repairs and repair of circuit cards and A5 modules, which ensure radio frequency and pulse accuracy, said Bob Harvey, an electronics mechanic.

"We also align the system; however, alignments require an AN/UPM-362 Transponder Test Set," he added. "We don't have that test set so we worked with Production Engineering to develop a solution."

Alignments ensure that the test sets, especially the A5 module, work properly with components such as the different–length cables used in various aircraft and ships.

"We developed an external tester as a troubleshooting aid for the A5 that nobody else had before," said Martin Simko, electronics mechanic. "It has more capability, giving us a better idea of the condition of the A5 module."

"Our standard workload also involves support shops from the Systems Integration and Support Directorate," Ross noted. "The test sets from the field can be very dirty and beat up. They are repaired into like-new condition. Our customer is very happy with our work."

Ross said division personnel completed 75 test sets in Fiscal Year 2003 and completed another 15 after the urgent request was fulfilled.

"The entire APX-72 program has been an outstanding success," said George Bellas, Avionics–Intelligence Electronics Warfare Systems Directorate Systems director. "Division personnel saved $859,000 in FY03 and are currently saving more than $1,300 per unit in FY04, which equates to $1.5 million. This is all attributed to the employees learning the Lean process and implementing Lean initiatives to do the work better, cheaper and faster."

Tobyhanna Army Depot is the Defense Department's largest center for the repair, overhaul and fabrication of a wide variety of electronics systems and components, from tactical field radios to the ground terminals for the defense satellite communications network. Tobyhanna's missions support all branches of the Armed Forces.

About 3,700 personnel are employed at Tobyhanna, which is located in the Pocono Mountains of northeastern Pennsylvania.

Tobyhanna Army Depot is part of the U.S. Army Communications-Electronics Command. Headquartered at Fort Monmouth, N.J., CECOM's mission is to research, develop, acquire, field and sustain communications, command, control computer, intelligence, electronic warfare and sensors capabilities for the Armed Forces.

Mr. Ricchiazzi writes for the Tobyhanna Army Depot Public Affairs Office.

Suggestion is real dust buster: Employees' idea cleans up Patriot component

by Michele Yeager

Tobyhanna army depot, Pa.—Three electronics mechanics here devised a solution to a problem that was causing dust and debris to enter parts of the Patriot Missile System.

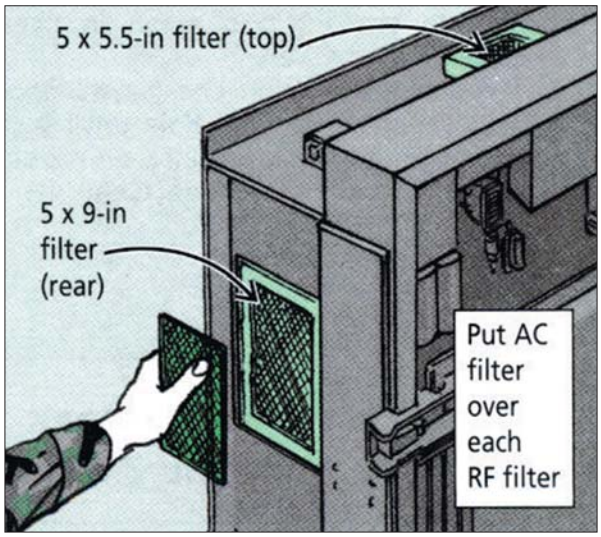
Charlotte Ache, Henry Eggert and Michael Verrastro, who work in the depot's Surveillance Systems Directorate, perform mechanical checks on the Patriot Missile's Identification Friend or Foe systems, which are overhauled and repaired here.

They realized that there were inadequate air filters on the signal processor, which was allowing unwanted particles to go through the system, causing equipment failures.

They submitted a suggestion through the Army Ideas for Excellence Program to add filter material and will share a monetary award of $2,700.

The award was approved at the U.S. Army Communications-Electronics Command level, based on the highly significant, intangible improvement to the value of a product, said Bob Reese (Scranton), the depot's AIEP coordinator.

"As the Patriot systems are returned from the field and come through Tobyhanna for repair, we continually noticed that excessive sand was clogging the filtering system of the signal processor," Ache explained. "Our suggestion reduced equipment failures and drastically cut maintenance time."



A suggestion to stop sand from clogging the Identification Friend or Foe component in Patriot missile systems was included in the December issue of *The Preventive Maintenance Monthly*, a maintenance guidance publication for Soldiers. (Graphic courtesy of *The Preventive Maintenance Monthly*)

The signal processor controls the IFF functions for the Patriot system. It is housed within a side panel of the system and uses the cooling fans of the radar.

Prior to suggestion implementation, it was not adequately protected from environmental hazards, such as sand and dust.

"Contamination related to environmental conditions was being inducted into the signal processor, resulting in pitting and malfunctioning of the internal components," Verrastro added. "When the Patriot Missile System was deployed to South West Asia last year in support of Operation Iraqi Freedom, the problem increased because of desert conditions.

"Our suggestion added another layer of air filtering material to the existing RF filter. We secure it to the frame of the air supply with Velcro strips."

"We chose Velcro because it is easily accessible to soldiers in the field, as well as easy to handle," Ache added. "It can be removed easily to clean or replace the filters."

Additionally, the longevity of the unit in the field is now 10 times greater regarding sand intrusion, Verrastro said. "Our contact with the warfighters in the field verifies this."

The use of this air filter has reduced manhours required to clean and repair the signal processor, in addition to reducing equipment failures, according to the suggestion evaluation prepared by Edward Seamans, an electrical engineer at CECOM who granted approval of the idea.

The suggestion was implemented by CECOM only three weeks after it was submitted because of the urgency to ensure the Patriot's operations were not further affected.

Also, the suggestion was included in the December issue of *The Preventive Maintenance Monthly*, a maintenance guidance publication for Soldiers.

Ms. Yeager is assistant editor with the Tobyhanna Army Depot Public Affairs Office.

Want to learn about the good, the bad and ugly of IT buys? Come to ASCP's 2004 Army Information Technology Conference

FORT MONMOUTH, N.J. - The Army Small Computer Program will conduct its 2004 Army Information Technology Conference from June 8-10, 2004, at the Hershey Lodge and Convention Center, Hershey, Pa. The theme for the conference is "Centralizing IT Enterprise Acquisitions… the good, the bad and the ugly."

The conference – which is free for all Army, Department of Defense, federal/government employees, support contractors, and exhibiting vendors - brings together the most important and knowledgeable people driving the Army's present and future IT requirements and will also feature a number of industry briefings, an internet café and hospitality events.

Guest speakers will include Kevin Carroll, the Program Executive Officer, Enterprise Information Systems; BG Charles W. Fletcher Jr., U.S. Army Assistant Deputy Chief of Staff for Logistics (G-4); COL Mark Barnette and Steve Klynsma of the Army Chief Information Office/G6; James Claussen, co-chair of the DoD Enterprise Software Initiative Working Group; and retired MG Robert Dees of Microsoft.

In the exhibit hall, more than 30 vendors will showcase the latest IT products and services available on ASCP contracts and Blanket Purchase Agreements, including the newest Information Technology Enterprise Solutions awards and products from CA, CDW-G, Dell, DLT, EMC, Gateway, GovConnection, GTSI, HP, ID, IBM, iGov, Immix, Insight, Lexmark, Lockheed, MPC, Mythics, Softchoice, Panasonic, PlanetGov, Structurewise, QSS, Sybase, Xerox and more.

Attendees may join the Open Forum Panel Discussion and hear from industry and government experts about "Centralizing IT Enterprise Acquisitions… the good, the bad and the ugly." The good - what benefits can be realized for both the Army and Industry? The bad - what are the "no-nos" about centralizing IT acquisitions - too much, too soon? The ugly - what are the hardest things to change - cultures, mindsets, "ain't broke,

Want to learn about the good, the bad and ugly of Information technology buys – and get some keyboard time with the latest IT products? Then come to the Army Small Computer Program's 2004 Army Information Technology Conference, June 8-10, 2004 at the Hershey Lodge and Convention Center, Hershey, Pa.

don't fix it" attitudes?"

Attendees may also learn more about Performance Based Contracting within the ITES environment and how to get the most out of the Army's Enterprise buy for Microsoft Desktop and Server software products through formal side-bar training sessions that were designed primarily from ASCP's interaction with its customers over the past six months.

Attendees can earn continuous learning credits, get OPSEC training

Ray Semko, the famed "Diceman" from the Interagency OPSEC Support Staff, will present a provocative, uncompromising and irreverent look at the world of security. Proof of attendance for Semko's 90-minute presentation will be issued, which may satisfy local requirements for an annual security briefing.

Defense Acquisition Workforce Improvement Act members of the Defense Acquisition Workforce can earn required Continuous Learning Points by attending the AITC. DAWIA requires acquisition billeted personnel to participate in continuous learning activities. To earn continuing credits, a supervisor must approve attendance on an employee's individual development plan. Reference for this is the Under Secretary Of Defense (Acquisition and Technology) Policy on Continuous Learning for the Defense Acquisition Workforce. You can also find this information at the Army Acquisition Corps website under Policy.

ASCP provides commercial IT products and services for the Army Enterprise - including hardware, software, peripherals, networking and support services – which comply with DoD and Army policies on standardization and interoperability. ASCP takes the hassle out of buying computers in the federal government, as ASCP vendors can deliver in as little as two days after receiving an order.

To register, or for more information about the 2004 Army Information Technology Conference, visit the ASCP website at https://ascp.monmouth.army.mil or call 1-888-232-4405 or 732-427-6787.

Unique satellite communications system supports missile defense

by Anthony Ricchiazzi

Tobyhanna army depot, Pa.— Engineers and technicians have designed and built a satellite communications system that supports the ground-based missile defense program in Alaska.

Work on the system began in early 2000 when the Program Manager for Defense Communications and Army Transmissions Systems tasked Tobyhanna to build the AN/TSC-86D satellite communications system that could act as a fixed terminal at a site until a permanent system is installed.

Employees from the depot's Satellite Communications Systems, Production Support Services and Systems Integration directorates carried out the mission.

"It's intended as a temporary system, but is complete enough that it will be used as a communications system by itself," said John Deininger, electronics engineer, SATCOM.

The system is used for voice, data and video communications. It is currently supporting the Missile Defense Space Battalion, the first ground-based midcourse defense battalion, at Fort Greely, Alaska.

The battalion will provide operational control and security over ground-based interceptors located in Alaska to protect the nation from limited ballistic missile attacks.

"The 86D is a unique, first-of-its kind system; it has dual antennas for communications through separate satellites, but can operate using one antenna," Deininger said.

The system is composed of five trailers, each about 40 feet long. The heart of the system is the 86D trailer that houses the main systems, such as modems, channel converters and baseband racks.

"There is also a supply and maintenance trailer, a power trailer that provides uninterruptible power systems and generators, a trailer that houses the antennas and air conditioning equipment, and an equipment trailer, which has all the equipment to assemble the system," said Charles Cortese, mechanical engineering technician, SATCOM. "We customized each trailer to not only house equipment meant for a fixed site, but also to be transportable by C-17 cargo aircraft."

Depot technicians extensively modified the trailers. For example, special undercarriages and tires were installed to help the trailers fit into a C-l 7. Also, the 86D trailer's height had to be lowered.

"One of our major hurdles was getting some of the moving equipment certified for Air Transportability," said Tom Musso, SATCOM. "All trailer design details were provided to the Transportability Group at Wright Patterson Air Force Base (Ohio). As a result of resolving this, we received C-130 and C-17 transportation certification."

Personnel also designed and fabricated support brackets, hundreds of feet of cables and electron-

ics racks, sometimes redesigning racks during the process when upgrades were requested.

"The entire electrical power supply system was fabricated here," noted Jack Pallien, electronics technician, SATCOM. "We also modified the lightning protection system."

"The system is totally redundant; it will not go off the air," added Richard Budgeon, electronics technician, SATCOM. "If a component goes down, its function is automatically switched to another component."

Members of the Tobyhanna Army Depot installation team assist to unload a depot–designed and fabricated AN/TSC-86D satellite communications terminal from a C-17 cargo plane in Alaska. The terminal will support a missile defense battalion until a permanent SATCOM site is built.

PM DCATS supplied the main SATCOM systems.

Completed in January 2003, the system was deployed to Schriever Air Force Base, Colo., in March 2003, to support the AN/GSC-52 Modernization Program and returned to Tobyhanna in August 2003, where additional upgrades were installed. Tobyhanna technicians are currently installing the system in Alaska.

Installation includes staging all the trailer assemblies, erecting the antenna assemblies, properly anchoring the system and connecting all the external power, grounding and communication cabling.

"Once that is done, a second crew will align and test the system prior to completing on–site final acceptance testing," Budgeon said. Tobyhanna will maintain the system wherever it is fielded.

"We received great support from several (depot) directorates," Musso said. "All told, there were about 45 people throughout the depot who had a hand in completing this project."

Mr. Ricchiazzi is with the Tobyhanna Public Affairs Office.

Fort Monmouth team provides communications Reachback for logisticians in Iraq, Afghanistan

by Stephen Larsen

It's pretty much a given. In a war zone, Combat Service Support units - which support the warfighter's logistics needs, from bullets to butter - aren't going to get much in the way of communications. Military communications systems are usually focused on maneuver and control, so the logistics slice is often insufficient to meet the communications requirements of forward-deployed logistics elements.

Until now, that is.

Thanks to a trio of systems provided by the Product Manager, Defense Wide Transmission Systems - including Very Small Aperture Satellite Terminals in tandem with the Multi-Media Communications System and the Combat Service Support Automated Information Systems Interface - the Army's forward-deployed CSS logistics elements in Iraq and Afghanistan now have communications Reachback capabilities to Continental United States support facilities.

How successful are these systems? According to CWO2 Brian Wimmer, Automation Management Officer for the 4th Infantry Division in Iraq, the systems have "hit a home run."

"The VSAT has been the most consistently available method of connectivity available anywhere in theater throughout OIF I (Operation Iraqi Freedom I)," said Wimmer. "The ability of Forward Support Battalions to electronically pass and track supply requisitions cannot be overstated. VSAT has been a Combat Power force multiplier directly contributing to greater operational readiness rates and reduced down time of combat systems in the entire Task Force."

Heady praise, indeed. LTC Earl Noble, who as PM DWTS is assigned to the Project Manager, Defense Communications and Army Transmission Systems at Fort Monmouth, is quick to point that what makes the VSAT valuable is the capability it provides in tandem with systems like MMCSO and CAISI.

A deployable office for Combat Service Support units

MMCSÒ, said Noble, is a modular, rapidly-deployable, mobile system that provides forward-deployed logistics elements with voice, video and data communications, with connectivity to the Defense Switched Network and commercial telephone systems and access to Non-Secure Internet Protocol Router Network , Secret Internet Protocol Router Network and e-mail.

"MMCSÒ provides Combat Service Support people the same communications capabilities they have back in their home station offices," said Noble, "except that it's deployable to wherever in the world CSS units are deployed."

Noble said that MMCSÒ can be configured in sizes ranging from a micro "flyaway" unit in three transit cases for 24 users to a mega unit accommodating more than 1,500 users. The mega unit comes in a trailer or shelter, complete with air conditioning and heating – "truly a deployable office," said Noble. At

the low end, he added, the MMCSÒ cost is about $16,000 for a micro unit and at the high end, about $1 million for a mega unit in a shelter or trailer.

The MMCSÒ configurations are used in conjunction with either dual-band (C and Ku band) or tri-band (C, Ku and X band) VSATs to provide satellite connectivity back to sustaining base information systems.

Exactly how small are Very Small Aperture Satellite Terminals? They come in two sizes, said Noble, 1.8 meter or 2.4 meter quick-erect sizes, which can typically be set up by a two-person team in 30 minutes.

"MMCSÒ used with VSAT is a mobile, commercial SATCOM (satellite communications) capability for the CSS community," said Noble, "supporting broadband information exchange, rapidly deployable anywhere in the world, and fully integrated into the GIG (Global Information Grid)."

For smaller networks - where the emphasis is on e-mail and data transfer, such as with CSS users - Noble said the use of time division multiple access - a digital transmission technology that allows multiple users to access a single radio-frequency channel by allocating unique time slots to each user - can reduce costs.

"By contrast, most networks assigned a fixed bandwidth based on the highest expected demand," Noble said. "But not everybody needs the same bandwidth all the time, so why pay for huge bandwidth all the time? That's like always having a huge warehouse full of ammo, regardless of how often you need it."

He gave an example of 30 users, each of whom typically need only 250 kilobits per second of bandwidth, but occasionally need up to 1 megabits per second. "Instead of buying 1 meg all the time for each of 30 users at a cost of $300,000 per month," said Noble, "we buy only 250K for each user, at a cost $30,000 per month - and pay a surcharge just for the times they actually need more than that. That's a 90 percent cost reduction."

Standing outside the Fort Monmouth Network Operations Center are members of the team that helps keep the Army's forward-deployed logisticians in Iraq and Afghanistan connected to CONUS support facilities (left to right): LTC Earl Noble, the Product Manager, Defense Wide Transmission Systems; Art Reiff, the Deputy Project Manager, Defense Communications and Army Transmission Systems; Archie Castle of TAMSCO; Jeff Price, project leader with PM DWTS; Pete Berardi of CECOM's Logistics and Readiness Center; and Tom Wasilewski of TAMSCO.

Support to the CENTCOM Area of Responsibility

All in all, said Noble, PM DWTS has fielded more than 90 MMCSÒ/VSAT systems for Warfighters in Iraq, Kuwait and Afghanistan, for customers including the Coalition Forces Land Component Command; the U.S. Central Command; the Surface Deployment and Distribution Command (SDDC, formerly known as the Military Traffic Management Command); the Product Manager, Medical Communications for Combat Casualty Care and U.S. Army Forces Central Command.

Noble said that a key user in the CENTCOM area of responsibility is the Army Material Command's Army Field Support Command, for which PM DWTS has provided a network of some 32 systems.

"Our AFSC network provides a strategic communications backbone for AMCs LARs (logistics assistance representatives) in Southwest Asia," said Noble

The AFSC network is backed 24-hours-a-day, seven-days-a-week by a Network Operations Center, located at Fort Monmouth, said Noble, for a variety of reasons.

"We need to hit the Telstar 12 satellite to reach the Warfighter in Southwest Asia," said Noble. "Due to the curvature of the Earth, the NOC must be on east coast to hit the Telstar 12 satellite because of latency (response time) and throughput (capacity) issues."

Another reason the NOC is at Fort Monmouth, said Noble, is to take advantage of facilities and personnel of the Communications-Electronics Research, Development and Engineering Command's Space and Terrestrial Communications Directorate and the U.S. Army Communications-Electronics Command's Logistics and Readiness Center. "There's a wealth of facilities and expertise here at Fort Monmouth," said Noble.

Noble added that his team includes some 67 contractors from TAMSCO, on the ground in the CENTCOM AOR, in Iraq, Afghanistan, Uzbekistan and Kuwait.

According to Wimmer, some of these contractors were among the first civilians that came into Iraq during the war and demonstrated "extraordinary professionalism" in providing support to VSATs for the CFLCC.

"They (the contractors) have been extremely cooperative and accommodating and have integrated very well into my CSSAMO (Combat Service Support Automation Management Office) team," said Wimmer. "Their mission assessment acumen, acute technical skill and sense of operational priority are precisely what the Army is looking for in contractors on the battlefield. They have lived like soldiers and have the bug bites to prove it."

Noble takes it a step further. "I can't say enough about these people," he said. "They're away from their families for a year at a time. Some of them have been shot

at, robbed, subject to car bomb and mortar attacks – but they stay there and do the job for our Soldiers."

CAISI comes to bat for Warfighter

The third piece PM DWTS is providing to solve the logistics puzzle for the forward–deployed CSS logistician is CAISI, the Combat Service Support Automated Information Systems Interface, a secure, wireless local area network that provides "last-mile" connectivity between combat service support computers and their logistics base networks.

"When you add CAISI to the mix, CSS folks can go wireless, and extend the MMCSÒ/VSAT capability to remote users in the field," said Noble.

CAISI, with 11Mb wireless line-of-sight transmission, encryption on all wireless LAN links and 2Mb Digital-Subscriber Line backup capability for non-LOS requirements within a four mile distance, extends tactical connectivity capability from the theater level to the Brigade Support Area, and is providing traditionally-lacking communications for combat service support missions such as supply chain management, maintenance and business systems. CAISI has been lauded by CSS folks for helping to eliminate "sneaker net" – the need to physically walk information from one point to another in the rear area.

Wimmer said that when VSAT is used with CAISI, the systems offer logisticians a "one-two punch" in establishing connectivity across Forward Operation Bases with limited resources. "This, additionally," said Wimmer, "provides commanders greater flexibility to locate local assets without the constraint of compromising connectivity."

MAJ Forrest Burke, who was logistics automation chief with the CFLCC during OIF in Kuwait, echoed that. "CAISI allowed us to be much more flexible in where we positioned units, both in tactical and garrison facilities," said Burke.

Warfighters around the world will soon be able to enjoy the capabilities of MMCSÒ, VSAT and CAISI, said Noble, pointing to plans to incrementally field more than 700 additional SATCOM systems worldwide in support of the CSS community.

Wimmer, for one, applauds the effort and calls for the SATCOM capabilities provided by PM DWTS to become part of the Army inventory, provided as standard equipment to every support battalion.

"The reliability and performance of the VSAT has truly been extraordinary," said Wimmer. "The benefits of having dedicated VSAT resources are undeniable."

Mr. Larsen is a Public Affairs Officer with Program Executive Office, Enterprise Information Systems at Fort Monmouth, N.J.

1st Signal Brigade on cutting edge of field communications

Stars and Stripes, Pacific edition

YONGSAN GARRISON, South Korea — The Army's 1st Signal Brigade — which handles voice and data communications for forces on the peninsula — has become the first brigade to field three of the military's newest control systems, allowing commanders to manage battlefield communications.

The Integrated Systems Controls system will strengthen the ability of command-and-control centers to manage tactical networks that often are cluttered by dozens of voice and data sources, officials said.

"The ISYSCON is the most advanced tool General Dynamics has built to date," said CPT Michael Kaul, Headquarters and Headquarters Company, 1st Signal Brigade. "It provides planners the ability to manage all available tactical assets in the brigade."

The system relies on two advanced software programs to follow all data paths on the military's network. If one or more routing paths or links have been damaged, officials said, the system will track and forward that information.

"Real-time" tracking of communications is one of the biggest benefits, 1st Signal Brigade officials said.

"With the networking monitoring tools we are able to capture near-real-time information and current status of the network," said WO Robert Byrd, of the 307th Signal Battalion. "This is an important part of the situational awareness necessary to react promptly, and possibly save a soldier's life because we know what is happening at that moment."

Another feature of the ISYSCON is that it houses a full database of all tactical equipment and communications gear for every unit in the Army, officials said.

"This gives us the opportunity to preplan for units being deployed from the U.S. to the Republic of Korea and tie into our network, just in the case of a future conflict," Kaul said.

The system also can help units set up communications hubs in terrain that otherwise might block or disrupt signals, officials said.

ISYSCON makes use of maps and terrain models to simulate transmission strengths from various locations.

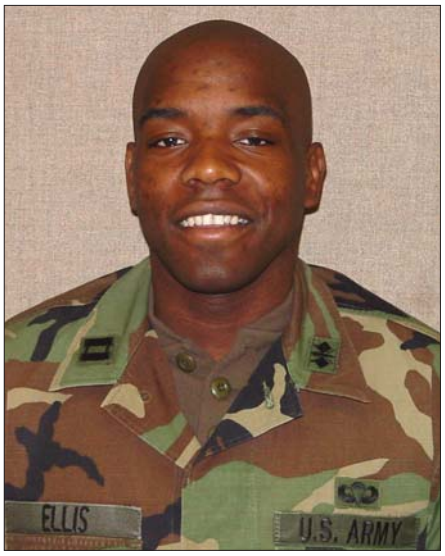
The system then makes a recommendation of where to set up communications systems so that the impact of rough terrain on signal strength is mitigated.

SIGNALEERS

CPT Ellis Selected to Attend Marine Corps Expeditionary Warfare School

by CPT Darcy Saint-Amant

Instead of heading to Fort Gordon for the Captains' Career Course next summer, CPT Tony O. Ellis will be joining the few and the proud aboard Marine Corps Base Quantico, for the Expeditionary Warfare School in July. Ellis was selected as one of five Signal Corps



CPT Tony O. Ellis was selected for the Expeditionary Warfare School.

officers to attend EWS in lieu of the Captains' Career Course.

The Marine Corps University runs one EWS course each year and only 23 percent of all Marine Corps captains are selected to attend in residence.

Ellis will spend ten months with Marine Corps, Air Force, Navy and international officers learning about expeditionary operations, joint doctrine and the Marine Corps Planning Process (similar to the Army's Military Decision Making Process). For the last eight weeks of EWS, communications officers attend the Marine Corps' C4I Planners' Course.

Ellis is from Vaiden, Miss. and is currently serving as the Executive Officer for B Company, 302nd Signal Battalion at Fort Meade, Md.

To compete for selection to attend EWS, a DA 4187 and two letters of recommendation are due to the Signal non-branch qualified captains' assignments officer by November each year. A board selects the most qualified applicants and results are released in January. For more information, see the EWS website at: www.mcu.usmc.mil/ews.

CPT Saint-Amant is the commander of B Company, 302nd Signal Bn., 21st Sig. Bde., Fort Detrick, Md.

SIGNAL UNITS

SIGNAL SOLDIERS RECEIVE NAVAL CITATION: TROOPS DECORATED FOR SUPPORTING MARINES IN IRAQ

by SGT M. William Petersen

FORT HUACHUCA, Ariz. — The Soldiers of 86th Signal Battalion and C Company, 40th Signal Battalion were awarded the Naval Presidential Unit Citation March 24 on Brown Parade Field for their support during Operation Iraqi Freedom.

The units were awarded the Citation for supporting I Marine Expeditionary Force. The ceremony marked the 34th time the Naval Presidential Unit Citation has been presented since its creation, and the first time it has been awarded since 1968.

To represent the Marine Corps, LTG Robert M. Shea, director of Command, Control, Communications and Computer Systems for The Joint Staff, hung the streamer on each unit's guidon.

"A Presidential Unit Citation carries accolades of the Commander in Chief. Few units receive this award," Shea said.

As a Marine Corps communicator, Shea identified the crucial need for flexible, dependable and rapid communications on the battlefield.

"I can't state the absolute necessity of things taken for granted at home, like picking up a phone and having a dial tone … It becomes a matter of life and death," Shea said. "You were truly an enabler on the battlefield."

Both part of 11th Signal Brigade, C Company 40th Sig. Bn. and 86th Sig. Bn. were presented battle streamers along with IMEF for their accomplishments in Iraq from March 21 to April 24, 2003.

"These Soldiers represent the 1,800 members of the 11th Sig. Bde. Thunderbirds, most of whom have been deployed for a very long time, and all of whom have answered the nation's call in the Global War on Terrorism," said COL Brian R. Hurley, commander of 11th Sig. Bde. "This demonstrates our true Joint capability and, more importantly, recognizes the heroic efforts of these outstanding soldiers."

The Secretary of the Navy - in the name of the President - awards the Naval Presidential Unit Citation to any ship, aircraft, or naval unit, or any Marine Corps aircraft, detachment, or higher unit for outstanding

Two units of the 11th Signal Brigade received the Naval Presidential Unit Citation.

performance in action against an armed enemy of the United States on or after Dec. 7, 1941.

To justify the citation, the unit must have clearly rendered itself conspicuous by action of a character comparable to that which would merit the award of a Navy Cross to an individual. The citation is designated to recognize specific acts of heroism on the part of the unit acting as a team.

The 11th Sig. Bde. is headquartered at Fort Huachuca, Ariz., and provides tactical communications capabilities such as secure and non-secure phones, Internet, video teleconferencing and satellite communications. Thunderbird Soldiers supported Operation Iraqi Freedom from sites throughout Southwest Asia including Iraq and Kuwait, and some are still deployed in support of the Global War on Terror.

Historical information regarding the Naval Presidential Unit Citation was provided by the U.S. Marine Corps Historical Center.

SGT Petersen is the Public Affairs chief for 11th Signal Brigade and writer/photographer/editor of the unit's magazine, Thunderbird Quarterly. *He has previously worked on Fort Rucker's* Army Flier *and Joint Task Force - Bravo's* The Iguana *in Honduras. He is a native of Chicago, Ill.*

OF INTEREST

DOCUMENT WARRIORS

by Judith Reid

Just how big are 39,000 feet of paper files? Big enough to fill a former truck plant, and enough work to keep six archives technicians fully engaged. That's the U.S. Army Europe Command Records Holding Area located in Bensheim, Germany. It is home to archived records from throughout the European theater.

What's an "archived record?" It is information the Army wants to keep for a long time. Information it may need in the future for medical research, legal cases, or lessons learned. Households archive records all the time. Those are the old tax files, old medical records, and past personnel papers hiding in a box in the basement. "Current records" are those hand carried during a PCS. These are the current medical and personnel records, the kids' school records and various banking documents. Current records are papers and electrons that are actively in use. Archived records are past active use but may be needed, and are, therefore, retained.

The Army also retains records, lots of records. In Europe, 39,000 boxes of paper and innumerable bits and bytes of electrons. What kind of records are these? What is in this archive library? Maybe by following a military operation, we can understand the value of this collection.

Let's use Operation Joint Endeavor in Bosnia to follow the record trail. In 1995 a Warning Order came from the Pentagon to the U.S. European Command to move the 1st Armored Division into Sarajevo, Bosnia. After that, EUCOM produced the first Operations Order to 1AD and others. From that moment on, lots of electronic and paper-based records were generated by a host of Soldiers, civilians and contractors: Fragmentary Orders and their supporting documents. Somewhere a 42L created a personnel roster and transportation orders for troops. In another office, a contractor created supply movement orders for equipment, while at the hospital, a civilian was reviewing and updating shot records. The personnel roster, the transportation and supply orders and the updated medical records are all now in the UCRHA.

Then there were the financial documents. Funding to support the OPORD came from a mix of operational funds, unfunded requirements and contingency operations funds. Count at least three different sets of records in the system to pay for the efforts of OEF. All three sets of financial records are housed at UCRHA.

When 1AD moved into Sarajevo, they set up camp. Can you hear the FRAGOs coming out in a continuous feed from the printer? With every day and every action, more documentation is created. 1AD engaged the enemy, supplies were used, maintenance occurred, Soldiers were evacuated, prisoners were taken, forms were filled out, more forms were filled out – paper, paper, paper. Electrons, bits and bytes. All documents, all records. The unending documentation, even when done electronically seems overwhelming. And to what end?

For history. For posterity. For research. For the ability to know what happened from the sounding bugle to the final battle. The ability to reconstruct the engagement from its historical records has proven critically important to the Army. It helps in creating the evaluation called Lessons Learned. It's how the Army retools itself after each operation. What went right and what could we have done differently? This information is gathered from operational records, analyzed and then plugged into the planning process for future improvement. When legal questions arise, data is pulled from the 39,000 archived boxes. When someone's past x-ray is needed, it may come from Bensheim. When the history books are written, information comes from UCRHA's primary data store-house for background.

Every day, dozens of boxes of records arrive into UCHRA. Every day new inquiries come in from lawyers, medical professionals and researchers for information from that collection. Every day six "document warriors" receive, catalogue, store, search, retire and destroy critical information the Army holds dear. One doesn't often think of that box of documents in the basement until the IRS calls or an old back injury flairs up. But just like those couple of boxes that make every move with the family, the records holding facility in Bensheim is here, active, and answering questions every day for the good of the Soldier and the

good of the Army. Brigade of Excellence!

Ms. Reid is the Chief, Information Systems Management Division for the HQ, 2nd Signal Brigade in Mannheim, Germany. In this role, she leads the U.S. Army Europe's Command Records Holding Area and is the U.S. Army Europe's official mail manager. She came to this position after years of process reengineering experience, and as a researcher. Reid holds a masters of International Business Administration, and a Doctorate in International Management.

COMMENTARY

COMMENTARY: THE AMERICAN SOLDIER — ONE YEAR INTO OIF

by SFC Donald Sparks

WASHINGTON — When I was asked to write an editorial reflecting on the one-year anniversary of Operation Iraqi Freedom, initially I thought it would be too easy to transfer my thoughts to my fingers — yet this piece was a struggle.

I couldn't keep track of how often I pressed my backspace key or how often I deleted entire sentences and paragraphs because I knew whatever I wanted to say – it just had to be right. And then I recalled a quote from former Sergeant Major of the Army George W. Dunaway in a 1990 interview with the Center of Military History on the American Soldier.

I studied line by line his words and it is appropriate as we look back on a year in which our Army and the resolve of the American Soldier have been tested and friendships on the battlefield have been forged.

"The American Soldier…is unbeatable in war." The entire world witnessed first hand how lethal a well-trained, well-equipped Soldier can take out his enemy on the battlefield. Breaking tradition and putting aside its differences with the media, the Department of Defense allowed embedded journalists and reporters to eat, sleep and get dirty with Soldiers.

Although there was some early debate and griping from the American public about how much news coverage was too much, there is no question the role the media played in delivering to our homes the success and determination of the American Soldier on the battlefield.

"We cannot give the American Soldier too much credit…He deserves everything we can do for him and he deserves all the respect we can show him." When *Time* magazine announced the American Soldier as its Person of the Year, there had to be an overwhelming sense of pride for each and every Soldier wearing the uniform.

I hurriedly went and bought a copy. The anticipation of reading profiles of courage, stories of strife and passages of survival was worth the wait. And to quote one of the Soldiers on the cover, SGT Ronald Buxton, "It's not just us," Buxton said of the Person of the Year award. "It's all of us, all the Soldiers."

It seems in time of peace the American Soldier is forgotten. Yet in times of war, the American Soldier becomes an integral part of the American conscience. Instantly the freedom our nation takes for granted each day is remembered when each flag-draped coffin returns home. The American Soldier deserves respect for going into a foreign land and eradicating a regime of terror, pulverizing its foe and surviving moments in hell.

"They perform their duties magnificently and bravely." Whether it was on CNN, FOX News or MSNBC, the images of the American Soldier throughout the Operation Iraqi Freedom campaign displayed the significance of the Noncommissioned Officer Education System.

In many instances it was the young sergeant preparing and leading troops into harm's way. As the first line of the NCO Creed states, no one is more professional than I." Indeed the American Soldiers were professionals in carrying out their missions in Iraq.

"They don't make policies, and they don't declare war." By no means is this line to be interpreted that the American Soldier is a pawn on a chessboard. We simply do what we're told to do and we follow orders. The American Soldier on the battlefield doesn't care about duty, honor and country. The American Soldier cares about his teammate to his front, to his left, to his right and to his rear.

The American Soldier doesn't have the time to play politics on the battlefield. During the past year the American Soldier has served his country and his fellow Soldier. And when the order was given to fight, indeed the American Soldier did.

"But they fight, they bleed and they die." This past year more than 500 American service members have died in support of Operation Iraqi Freedom. It was someone's son, daughter, husband, wife, brother and sister. Those Americans gave the ultimate sacrifice serving our nation and securing the freedom of the Iraqi people.

I was told once a warrior's life is a lonely time with little joy, little thanks and visions not too kind. I'd like to think those brave warriors who died during this past year had their share of moments of joy, they'd been thanked more than once for serving their country and they'd envisioned many days of kindness.

We must all remember, one year later, name-by-name those Americans -- for they fought, they bled and they died.

"And they do it unhesitatingly." I've told many Soldiers, "The Army isn't for everybody and everybody isn't for the Army." For those who serve our nation and are sent into harm's way, we all know there are no guarantees on the battlefield — except for death. When the American Soldier goes into the valley of the shadows of death, he goes unhesitatingly.

The American Soldier during the past year in support of Operation Iraqi Freedom has done the nation proud. Mama might not understand why her son or daughter volunteers

for deployment. The American Soldier can tell mama there are values like loyalty, duty, selfless service, honor, integrity and courage we all use and hold close to us. Those values, and more, we share — unhesitatingly.

SFC Sparks is the NCOIC for the Army Intelligence Center and Fort Huachuca Public Affairs Office.

ACRONYM QUICKSCAN

1AD – 1st Armored Division
AIEP – Army Ideas for Excellence Program
AMC – Army Materiel Management
AFSC – Army Field Support Command
AOR – area of responsibility
ARCENT – Army Forces Central Command
ASCP – Army Small Computer Program
CAISI – Combat Service Support Automated Systems Interface
CECOM – Communications-Electronics Command
CENTCOM – Central Command
CERDEC – Communications-Electronics Research, Development and Engineering Command
CFLCC – Coalition Forces Land Component Command
CIE – Collaborative Information Environment
CONUS – Continental Unites States
CSS – Combat Service Support
CSSAMO – Combat Service Support Automation Management
DAWIA – Defense Acquisition Workforce Improvement Act
DCEE – Distributed Continuous Experimentation Environment
DDTP – Defense Distribution Depot Tobyhanna
DISN – defense information switch network
DoD –Department of Defense
DSL – Digital Subscriber Line
DSN – Defense Switched Network
EBO – effects based operations
ESI – Enterprise Software Initiative
EUCOM – U.S. European Command
EWS – Expeditionary Warfare School
FRAGO – Fragmentary Orders
FY – Fiscal Year
GIG – Global Information Grid
HPPC – High Performance Computer Center
IDP – individual development plan
IFF – Identification Friend or Foe
IMEF – I Marine Expeditionary Force
IOSS – Interagency OPSEC Support Staff
IT – Information Technology
ITES – Information Technology Enterprise Solutions
JOpsC – Joint Operations Concepts
Kbps – kilobits per second
LOS – line-of-sight
LRC – Logistics and Rediness Center
Mbps – megabits per second
MMCSS – Multi-media Communication System
MMCSO – Multi-Media Communications System
NIPERNET – Nonsecure Internet Protocol Router Network
NOC -- Network Operations Center
NORTHCOM – U.S. Northern Command
OIF – Operation Iraqi Freedom
OIF I – Operation Iraqui Freedom I
OJE – Operation Joint Endeavor
ONA – operational network assessment
OPORD – Operations Order
OPSEC – Operations Security
PACOM – Pacific Command
PBC – Performance Based Contracting
PEOEIS – Program Executive Officer, Enterprise Information Systems
PM DCATS – Program Manager, Defense Communications and Army Transmission Systems
PM DWTS – Program Manager, Defense Wide Transmission Systems
PM MC4 – Medical Communications for Combat Casualty Care
RCCs – regional combatant commanders
SATCOM – satellite communications
SDDC – Surface Deployment and Distribution Command
SIPERNET – Secure Internet Protocol Router Network
SJFHQ – Standing Joint Force Headquarters Core Element
SPP – Scale Parallel Processor
SOSA – system of systems analysis
SOUTHCOM – U.S. Southern Command
STRATCOM – Strategic Command
TDMA – time division multiple access
UC04 – Unified Course 04
UFRs – unfunded requirements
UQ04 – Unified Quest 04
UCRHA – U.S. Army Europe Command Records Holding Area
VSAT – Very Small Aperture Satellite
WARNORD — Warning Order

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